

Exhibit No.:
Issue: Lead Lag Study
Witness: Timothy S. Lyons
Type of Exhibit: Direct Testimony
Sponsoring Party: Liberty Utilities
(Midstates Natural Gas) Corp.
d/b/a Liberty Utilities
Case No.: GR-2018-0013
Date Testimony Prepared: September 28, 2017

**Before the Public Service Commission
of the State of Missouri**

Direct Testimony

of

**Timothy S. Lyons
ScottMadden, Inc**

On Behalf Of

**Liberty Utilities (Midstates Natural Gas) Corp.
d/b/a Liberty Utilities**

September 2017



DIRECT TESTIMONY
OF
TIMOTHY S. LYONS
LIBERTY UTILITIES
BEFORE THE
MISSOURI PUBLIC SERVICE COMMISSION
CASE NO. GR-2018-0013

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Timothy S. Lyons. My business address is 1900 West Park Drive, Suite 250, Westborough, Massachusetts 01581.

Q. PLEASE DESCRIBE YOUR CURRENT POSITION.

A. I am a Partner at ScottMadden, Inc. (“ScottMadden”).

Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE.

A. I have more than 30 years of experience in the energy industry. I started my career in 1985 at Boston Gas Company, eventually becoming Director of Rates and Revenue Analysis. In 1993, I moved to Providence Gas Company, eventually becoming Vice President of Marketing and Regulatory Affairs. Starting in 2001, I held a number of management consulting positions in the energy industry first at KEMA and then at Quantec, LLC. In 2005, I became Vice President of Sales and Marketing at Vermont Gas Systems, Inc. before joining Sussex Economic Advisors, LLC (“Sussex”) in 2013. Sussex was acquired by ScottMadden on June 1, 2016.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND.

A. I hold a Bachelor’s degree from St. Anselm College, a Master’s degree in Economics from The Pennsylvania State University, and a Master’s degree in

1 Business Administration from Babson College. A summary of my testimony
2 experience is included in Schedule TSL-1.

3 **II. PURPOSE AND OVERVIEW OF TESTIMONY**

4 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

5 A. The purpose of my testimony is to sponsor the lead-lag study, which is used to
6 determine Liberty Utilities (Midstates Natural Gas) Corporation d/b/a Liberty
7 Utilities (“Liberty” or the “Company”) Cash Working Capital (“CWC”)
8 requirement.

9 **Q. HAVE YOU PREPARED SCHEDULES TO SUPPORT YOUR**
10 **TESTIMONY?**

11 A. Yes. Schedules TSL-2 and TSL-3 summarize the results of the lead lag study,
12 and contain supporting schedules. The Schedules were prepared by me or under
13 my direction.

14 **Q. PLEASE DEFINE THE TERM “CASH WORKING CAPITAL” AS A**
15 **RATE BASE COMPONENT.**

16 A. The term “cash working capital” refers to the net funds required by the Company
17 to pay for goods and services between the time they are paid for by the Company
18 and the time customer payments are received by the Company. The cost of goods
19 and services includes: purchased gas expenses; operations and maintenance
20 (“O&M”) expenses; federal, state, and local taxes; employment taxes; and interest
21 payments on long-term debt.

22 **Q. HOW DID YOU DETERMINE THE CWC REQUIREMENT?**

1 A. The CWC requirement was based on the results of a lead-lag study, which
2 compares the net difference between the revenue lag and expense lag. The
3 revenue lag represents the number of days between the time customers receive
4 their service and the time customer payments are received by the Company. The
5 longer the revenue lag, the more cash the Company needs to fund its day-to-day
6 operations. The expense lag represents the number of days between the time the
7 Company receives goods and services used to provide service, and the time the
8 Company pays for those goods and services, *i.e.*, when the funds are no longer
9 available to the Company. The longer the expense lag, the less cash the Company
10 needs to fund its day-to-day operations.

11 **Q. DO THE RESULTS OF THE LEAD-LAG STUDY REPRESENT AN**
12 **ACCURATE ASSESSMENT OF THE COMPANY'S CWC**
13 **REQUIREMENT?**

14 A. Yes. The lead-lag study represents an accurate assessment of the actual CWC
15 needs during the test year for the NEMO, SEMO, and WEMO regions.
16 Furthermore, the methods used to conduct this lead-lag study are generally
17 consistent with those filed with the Commission in GR-2010-0192¹ for Atmos
18 Energy Corporation, the predecessor company to Liberty.

19 **III. LEAD-LAG STUDY APPROACH**

20 **Q. PLEASE SUMMARIZE THE RESULTS AND APPROACH OF THE**
21 **LEAD-LAG STUDY.**

¹ *In the Matter of Atmos Energy Corporation's Tariff Revision Designed to Implement a General Rate Increase for Natural Gas Service in the Missouri Service Area of the Company.* Filed December 28, 2009.

1 A. The lead-lag study is summarized in Schedule TSL-2 and shows net CWC
2 requirements of \$223,368 for the NEMO region, \$262,399 for the SEMO region,
3 and \$52,116 for the WEMO region for the period July 1, 2016 through June 30,
4 2017. The lead-lag study relied on consolidated data for the three regions that
5 was supplied by the Company, including: financial and customer data to
6 determine the revenue lags; a sample of invoices to determine the expense lags,
7 and; various other supporting documents.

8 **Q. PLEASE DESCRIBE DEVELOPMENT OF THE LEAD-LAG STUDY.**

9 A. The lead-lag study consists of two elements: revenue lags and expense lags.
10 Revenue lags measure from the time service is provided to customers until the
11 time customer payments are received by the Company. Expense lags measure
12 from the time service is provided to the Company until payment is made by the
13 Company. The lags are measured in days, converted to dollar-days, and
14 summarized for each cost element in the lead-lag study. The difference between
15 the revenue lag and expense lag determines if there is a net revenue lag (revenue
16 lag days are more than the expense lag days) or a net expense lead (revenue lag
17 days are less than the expense lag days) for each cost element in the lead-lag
18 study. The methodology and data used to determine revenue and expense lags for
19 the NEMO, SEMO, and WEMO regions was consistent.

20 **A. Revenue Lag**

21 **Q. PLEASE DESCRIBE THE COMPONENTS OF THE REVENUE LAG.**

1 A. Calculation of the revenue lag is summarized in Schedule TSL-3. The revenue
2 lag consists of three components: (1) the service lag; (2) the billing lag; and (3)
3 the collection lag.

4 **Q. WHAT IS THE SERVICE LAG?**

5 A. The service lag represents the number of days from the midpoint of the service
6 period, *i.e.*, when service is provided to customers, to the end of the service
7 period. Since service is provided during a calendar month, the service lag is one-
8 half of a calendar month, or on average 15.21 days.

9 **Q. WHAT IS THE BILLING LAG?**

10 A. The billing lag represents the number of days from the end of the service period to
11 the time bills are recorded and mailed to customers. The billing lag begins the
12 day meters are read, and ends the day bills are recorded and mailed to customers.
13 The lag includes review and validation of billing usage and amounts. The billing
14 lag was based on the Company's meter reading schedule.

15 **Q. WHAT IS THE COLLECTION LAG?**

16 A. The collection lag represents the number of days from the time bills are recorded
17 and mailed to customers to when payment is received. Collection lag was based
18 on the Company's monthly revenues over the test year and the average accounts
19 receivable balance to generate a turnover ratio. The turnover ratio was then
20 divided into 365, the number of days in the year, to derive the average collection
21 lag days.

22 **Q. HOW WERE LAG DAYS DETERMINED FOR REVENUES?**

1 A. The revenue lag was based on the sum of the revenue lag components discussed
2 above. The calculations are shown on Schedule TSL-3.

3 **B. Expense Lag**

4 **1. Purchased Gas Expense**

5 **Q. HOW WERE LAG DAYS DETERMINED FOR PURCHASED GAS**
6 **EXPENSES?**

7 A. Lag days for purchased gas expenses were based on the service lag (i.e., the
8 midpoint of the service period) and payment lag (i.e., the number of days between
9 the end of the service period and payment date).

10 **2. O&M Expenses**

11 **Q. HOW WERE LAG DAYS DETERMINED FOR O&M EXPENSES?**

12 A. Lag days for O&M expenses were determined by first separating the expenses
13 into four groups: (1) Operations and Maintenance (“O&M”) expenses, separated
14 between labor and non-labor expenses; (2) Taxes Other than Income Taxes; (3)
15 Income Taxes; and (4) Interest Payments on long-term debt. The lag days for
16 each of these groups was measured independently.

17 **Q. HOW WERE LAG DAYS DETERMINED FOR PAYROLL EXPENSES?**

18 A. Lag days for payroll expenses were based on the Company’s salary and wage
19 payment schedule, which pays employees on a bi-weekly basis. The lag days for
20 regular payroll expenses were based on the average number of days between the
21 midpoint of the pay period and the payment date to employees.

22 **Q. HOW WERE LAG DAYS DETERMINED FOR PENSION EXPENSES?**

1 A. Lag days for pension expenses were based on the Company's pension payment
2 schedule. Pension payments were made quarterly in the month following the
3 service period. The lag days for pension expenses were based on the number of
4 days from mid-quarter to the payment date for that quarter.

5 **Q. HOW WERE LAG DAYS DETERMINED FOR OPEB PAYMENTS?**

6 A. Lag days for OPEB payments were based on the Company's OPEB payment
7 schedule. OPEB payments were made annually in December for that calendar
8 year. The lag days for OPEB payments were based on the number of days from
9 the midpoint of the year to the payment date.

10 **Q. HOW WERE LAG DAYS DETERMINED FOR MEDICAL AND DENTAL**
11 **EXPENSES?**

12 A. Lag days for medical and dental expenses were based on the Company's payment
13 schedule for medical and dental expenses. Medical and dental payments are made
14 monthly at the start of the service period (*i.e.*, calendar month). The lag days for
15 medical and dental expenses were based on the number of days from midpoint of
16 the service period to the payment date.

17 **Q. HOW WERE LAG DAYS DETERMINED FOR AFFILIATE EXPENSES?**

18 A. Lag days for affiliate expenses were based on the Company's payment schedule
19 for affiliate expenses. Affiliate expenses are paid monthly following the service
20 period, which generally follows a calendar month. The lag days for affiliate
21 expenses were based on the number of days from midpoint of the service period
22 to the payment date.

1 **Q. HOW WERE LAG DAYS DETERMINED FOR OTHER NON-LABOR**
2 **O&M EXPENSES?**

3 A. Lag days for Other Non-Labor O&M expenses were based on a stratified sample
4 of 216 invoices out of 19,705 invoices paid during the test year. The expense lag
5 for each stratum was then calculated and weighed in proportion to the number of
6 transactions in each stratum. The sum of the weighted expense lags represents the
7 overall Other Non-Labor O&M expense lag.

8 **Q. DOES THIS SAMPLE METHODOLOGY DIFFER FROM THAT USED**
9 **IN ATMOS ENERGY CORPORATION'S PRIOR CASE?**

10 A. Yes, this methodology differs from that in the prior case. By developing a
11 stratified sample, the analysis is more representative of Other Non-Labor O&M
12 Expenses for the test year. The study determined the lag days between the date
13 services were provided to the Company and the payment date for those services.
14 If no information was available regarding the date services were provided, then
15 the date of the invoice was used. If no payment information was available, the
16 invoice was removed from the sample.

17 **3. Income Tax Expense**

18 **Q. HOW WERE LAG DAYS DETERMINED FOR FEDERAL INCOME**
19 **TAXES?**

20 A. Lag days for state and federal income taxes were based on the number of days
21 between the midpoint of the applicable tax period and the payment dates. The
22 payment dates were based on quarterly payments on April 18, June 15, September
23 15, and December 15.

1 **4. Taxes Other than Income Taxes**

2 **Q. WHAT TAXES ARE INCLUDED IN THE TAXES OTHER THAN**
3 **INCOME TAXES?**

4 A. Taxes Other than Income Taxes includes: (1) payroll-related taxes (FICA, Federal
5 Unemployment, and State Unemployment); (2) Ad Valorem taxes; (3) Missouri
6 Public Service Commission (“PSC”) Assessment; and (4) Missouri Department of
7 Transportation (“DOT”) taxes.

8 **Q. HOW WERE LAG DAYS DETERMINED FOR THOSE TAXES?**

9 A. Lag days for taxes other than income taxes were based on the number of days
10 between the midpoint of the service period and payment date.

11 **5. Interest Expense**

12 **Q. HOW WERE LAG DAYS DETERMINED FOR INTEREST EXPENSE?**

13 A. Lag days for interest expense were based on actual interest payments in the test
14 year. The lag days are calculated from the midpoint of the period for which the
15 interest was paid to the payment date.

16 **6. Sales Tax**

17 **Q. HOW WERE LAG DAYS DETERMINED FOR SALES TAX?**

18 A. Lag days for Sales Tax were based on the number of days between the time the
19 taxes are collected from customers and the time they are remitted to the state.

20 **IV. CONCLUSION**

21 **Q. WHAT WERE THE RESULTS OF THE LEAD-LAG STUDY?**

22 A. The CWC requirement for the three regions of Liberty Utilities is \$223,368 for
23 the NEMO region, \$262,399 for the SEMO region, and \$52,116 for the WEMO,
24 as shown in Schedule TSL-2.

1 **Q. DO THE RESULTS OF THE LEAD-LAG STUDY REPRESENT AN**
2 **ACCURATE ASSESSMENT OF THE COMPANY'S CWC**
3 **REQUIREMENT?**

4 A. Yes. The lead-lag study represents an accurate assessment of NEMO, SEMO,
5 and WEMO's actual CWC needs during the test year. Furthermore, the methods
6 used to conduct this lead-lag study are generally consistent with those previously
7 filed with the Commission.

8 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

9 A. Yes, it does.

Testimony Experience

Timothy S. Lyons
ScottMadden, Inc.

Sponsor	Date	Docket No.	Subject
Regulatory Commission of Alaska			
ENSTAR Natural Gas Company	06/16	Docket No. U-16-066	Adopted testimony and sponsored lead-lag study.
Connecticut Public Utilities Regulatory Authority			
Yankee Gas Company	07/14	Docket No. 13-06-02	Sponsored report and testimony for review and evaluation of gas expansion policies, procedures and analysis.
Illinois Commerce Commission			
Liberty Utilities (Midstates Natural Gas)	07/16	Docket No. 16-0401	Sponsored testimony for cost of service, rate design, and bill impact studies for a general rate case proceeding. The testimony includes proposal for new commercial classes and a decoupling mechanism.
Iowa Utilities Board			
Liberty Utilities (Midstates Natural Gas)	07/16	Docket No. RPU-2016-0003	Sponsored testimony for cost of service, rate design, and bill impact studies for a general rate case proceeding. The testimony includes proposal for new commercial classes.
Maine Public Utilities Commission			
Northern Utilities, Inc. d/b/a Unitil Gas Limited	06/15	Case No. 2015-00146	Sponsored testimony for proposed gas expansion program, including a zone area surcharge.
Maryland Public Service Commission			
Sandpiper Energy, Inc.	12/15	Case No. 9410	Sponsored testimony for cost of service, rate design, and bill impact studies for a general rate case proceeding. The testimony includes proposal for new residential and commercial classes.
Massachusetts Department of Public Utilities			
Boston Gas	03/88	Docket No. DPU 88-67-II	Sponsored testimony for rate reclassification of commercial and industrial customers for rate design proceeding.
Boston Gas	03/90	DPU 90-55	Sponsored testimony for weather and other cost of service adjustments, rate design and customer bill impact studies for general rate case proceeding.
Boston Gas	10/93	DPU 92-230	Sponsored testimony describing the Company's position regarding rate treatment of vehicular natural gas investments and expenses.
Missouri Public Service Commission			
Laclede Gas Company	04/17	Docket No. GR-2017-0215	Sponsored testimony for cost of service, rate design, bill impact and lead-lag studies.
Missouri Gas Energy	04/17	Docket No. GR-2017-0216	Sponsored testimony for cost of service, rate design, bill impact and lead-lag studies.

Sponsor	Date	Docket No.	Subject
New Hampshire Public Utilities Commission			
Liberty Utilities d/b/a Granite State Electric Company	04/16	Docket No. DE 16-383	Adopted testimony and sponsored lead-lag study.
New Jersey Board of Public Utilities			
Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas Company	8/16	GR16090826	Sponsored testimony for lead-lag study
Rhode Island Public Utilities Commission			
Providence Gas Company	01/96	Docket No. 2076	Sponsored testimony for rate reclassification of customers into new rate classes, rate design (including introduction of demand charges), and customer bill impact studies for rate design proceeding.
Providence Gas Company	11/92	Docket No. 2025	Sponsored testimony supporting the Integrated Resource Plan filing, including a performance-based incentive mechanism.
Providence Gas Company	02/96	Docket No. 2374	Sponsored testimony for rate design, customer bill impact studies, and retail access tariffs for largest commercial and industrial customers for rate design proceeding.
Providence Gas Company	04/97	Docket No. 2552	Sponsored testimony for rate design, customer bill impact studies, and retail access tariffs for commercial and industrial customers, including redesign of cost of gas adjustment clause, for rate design proceeding.
Providence Gas Company	08/01 09/00 08/96	Docket No. 1673	Sponsored testimony for changes in cost of gas adjustment factor related to projected under-recovery of gas costs; Filed testimony and witness for pilot hedging program to mitigate price risks to customers; Filed testimony and witness for changes in cost of gas adjustment factor related to extension of rate plan.
Providence Gas Company	06/97	Docket No. 2581	Sponsored testimony for rate plan that fixed rates for three-year period; included funding for critical infrastructure investments in accelerated replacement of mains and services, digitized records system, and economic development projects.
Providence Gas Company	08/00	Docket No. 2581	Sponsored testimony for extension of rate plan that began in 1997 and included certain modifications, including a weather normalization clause.
Providence Gas Company	03/00	Docket No. 3100	Sponsored testimony for de-tariff and deregulation of appliance repair service, enabling the Company to have needed pricing flexibility.
Railroad Commission of Texas			
CenterPoint Energy – Texas Gulf Division	11/16	GUD No. 10567	Sponsored testimony for lead-lag study.
Atmos Pipeline – Texas	01/17	GUD No. 10580	Sponsored testimony for lead-lag study.

Sponsor	Date	Docket No.	Subject
Vermont Public Service Board			
Vermont Gas Systems	02/11	Docket No. 7712	Sponsored testimony for market evaluation and analysis to support establishment of system expansion and reliability fund.
Vermont Gas Systems	12/12	Docket No. 7970	Sponsored testimony describing the customers to be served by a \$90 million natural gas expansion project to Addison County, Vermont; also describing the benefits of the project as well as the Company's programs and service offerings.

LEAD/LAG STUDY WORKPAPERS

Schedule TSL-2 Summary (SEMO)

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Cash Working Capital Requirement
Summary (SEMO)

Line	Description	Revenue Requirement Amount	Average Daily Amount	Revenue Lag	Ref.	Expense Lag	Ref.	Net (Lead)/Lag Days	Working Capital Requirement
	<u>Gas Supply Expense</u>								
1	Purchased Gas Costs	\$ 6,291,191	17,236	49.62	A	(40.14)	B	9.48	163,430
2									
3	<u>Operation and Maintenance Expenses</u>								
4	O&M, Labor	\$ 2,385,436	6,535	49.62	A	(13.00)	C	36.62	239,326
5	Pension Expense	\$ 160,667	440	49.62	A	(51.38)	C	(1.76)	(773)
6	OPEB	\$ 140,374	385	49.62	A	(167.00)	C	(117.38)	(45,143)
7	Medical and Dental Expenses	\$ 468,495	1,284	49.62	A	12.92	C	62.54	80,272
8	Uncollectibles	\$ 205,469	563	49.62	A	0.00		49.62	27,932
9	Affiliate Expenses	\$ 1,068,940	2,929	49.62	A	(42.50)	C	7.12	20,851
10	O&M, Other Non-Labor	\$ 2,122,012	5,814	49.62	A	(28.82)	C	20.80	120,906
11	<u>Total O&M Expenses</u>	\$ 6,551,392							\$ 443,372
12									
13	<u>Taxes Other Than Income Taxes</u>								
14	Ad Valorem	\$ 762,312	2,089	49.62	A	(169.85)	E	(120.23)	(251,097)
15	Payroll Taxes	\$ 187,823	515	49.62	A	(13.48)	E	36.14	18,596
16	PSC Assessment	\$ 68,287	187	49.62	A	41.13	E	90.74	16,977
17	DOT	\$ -	-	49.62	A	(55.66)	E	(6.04)	-
18	<u>Total Taxes Other Than Income Taxes</u>	\$ 1,018,422							\$ (215,524)
19									
20	Federal Income Tax	\$ (42,746)	(117)	49.62	A	(37.99)	D-1	11.63	(1,362)
21	State Income Tax	\$ (6,717)	(18)	49.62	A	(37.99)	D-2	11.63	(214)
22	Interest Payments	\$ 1,122,896	3,076	49.62	A	(91.00)	F	(41.38)	(127,303)
23	Sales Tax	\$ -	-	49.62	A	(13.45)	G	36.17	-
24									
25	<u>Total</u>	\$ 14,934,438	40,916						\$ 262,399

LEAD/LAG STUDY WORKPAPERS

Schedule TSL-2 Summary (WEMO)

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Cash Working Capital Requirement
Summary (WEMO)

Line	Description	Revenue Requirement Amount	Average Daily Amount	Revenue Lag	Ref.	Expense Lag	Ref.	Net (Lead)/Lag Days	Working Capital Requirement
	<u>Gas Supply Expense</u>								
1	Purchased Gas Costs	\$ 1,910,258	5,234	49.62	A	(40.14)	B	9.48	49,624
2									
3	<u>Operation and Maintenance Expenses</u>								
4	O&M, Labor	\$ 390,546	1,070	49.62	A	(13.00)	C	36.62	39,183
5	Pension Expense	\$ 22,960	63	49.62	A	(51.38)	C	(1.76)	(110)
6	OPEB	\$ 20,127	55	49.62	A	(167.00)	C	(117.38)	(6,473)
7	Medical and Dental Expenses	\$ 67,258	184	49.62	A	12.92	C	62.54	11,524
8	Uncollectibles	\$ 39,731	109	49.62	A	0.00		49.62	5,401
9	Affiliate Expenses	\$ 161,278	442	49.62	A	(42.50)	C	7.12	3,146
10	O&M, Other Non-Labor	\$ 275,136	754	49.62	A	(28.82)	C	20.80	15,676
11	<u>Total O&M Expenses</u>	\$ 977,036							\$ 68,347
12									
13	<u>Taxes Other Than Income Taxes</u>								
14	Ad Valorem	\$ 155,541	426	49.62	A	(169.85)	E	(120.23)	(51,233)
15	Payroll Taxes	\$ 26,279	72	49.62	A	(13.48)	E	36.14	2,602
16	PSC Assessment	\$ 9,798	27	49.62	A	41.13	E	90.74	2,436
17	DOT	\$ -	-	49.62	A	(55.66)	E	(6.04)	-
18	<u>Total Taxes Other Than Income Taxes</u>	\$ 191,617							\$ (46,196)
19									
20	Federal Income Tax	\$ (60,130)	(165)	49.62	A	(37.99)	D-1	11.63	(1,916)
21	State Income Tax	\$ (9,449)	(26)	49.62	A	(37.99)	D-2	11.63	(301)
22	Interest Payments	\$ 153,855	422	49.62	A	(91.00)	F	(41.38)	(17,443)
23	Sales Tax	\$ -	-	49.62	A	(13.45)	G	36.17	-
24									
25	<u>Total</u>	\$ 3,163,187	8,666						\$ 52,116

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Revenue and Collection Lag

Revenue Lag

Line	Description	Revenue Lag	Reference
1	Service Lag	15.21	
2	Billing Lag	4.08	A-1
3	Collection Lag	30.33	A-2
4	<u>Composite Revenue Lag</u>	<u>49.62</u>	

LEAD/LAG STUDY WORKPAPERS

Schedule TSL-3 (Tab B)

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Purchased Gas Costs

Line	Supplier	Production Month Start Service	Production Month Finish Service	Service Lag	Date Paid	Payment Lag	Total Lag	Amount	Dollar Days
1	NGPL - Sequent / Emera	5/1/2016	5/31/2016	(15.50)	07/11/16	(41.00)	(56.50)	77,614 \$	(4,385,165)
2	MRT - Centerpoint	6/1/2016	6/30/2016	(15.00)	08/01/16	(32.00)	(47.00)	132,361 \$	(6,220,950)
3	NGPL - Pipeline	6/1/2016	6/30/2016	(15.00)	07/18/16	(18.00)	(33.00)	98,380 \$	(3,246,550)
4	NGPL - Sequent / Emera	6/1/2016	6/30/2016	(15.00)	08/11/16	(42.00)	(57.00)	64,961 \$	(3,702,758)
5	Ozark - Pipeline	6/1/2016	6/30/2016	(15.00)	07/22/16	(22.00)	(37.00)	94,964 \$	(3,513,685)
6	PEPL - BP Energy	6/1/2016	6/30/2016	(15.00)	07/25/16	(25.00)	(40.00)	87,050 \$	(3,481,980)
7	Twin Eagle	6/1/2016	6/30/2016	(15.00)	07/25/16	(25.00)	(40.00)	143,757 \$	(5,750,289)
8	PEPL - Pipeline	6/1/2016	6/30/2016	(15.00)	07/21/16	(21.00)	(36.00)	176,344 \$	(6,348,371)
9	Southern Star - Pipeline	6/1/2016	6/30/2016	(15.00)	07/18/16	(18.00)	(33.00)	5,518 \$	(182,095)
10	Southern Star - Sequent / Atm	6/1/2016	6/30/2016	(15.00)	07/25/16	(25.00)	(40.00)	1,500 \$	(60,000)
11	PEPL - Laclede	6/1/2016	6/30/2016	(15.00)	07/26/16	(26.00)	(41.00)	315,435 \$	(12,932,815)
12	TETCO - Pipeline	6/1/2016	6/30/2016	(15.00)	07/22/16	(22.00)	(37.00)	216,423 \$	(8,007,642)
13	TETCO - Twin Eagle	6/1/2016	6/30/2016	(15.00)	07/25/16	(25.00)	(40.00)	415,976 \$	(16,639,024)
14	ANR	7/1/2016	7/31/2016	(15.50)	08/22/16	(22.00)	(37.50)	143,921 \$	(5,397,027)
15	MRT - Centerpoint	7/1/2016	7/31/2016	(15.50)	08/31/16	(31.00)	(46.50)	193,231 \$	(8,985,220)
16	NGPL - Pipeline	7/1/2016	7/31/2016	(15.50)	08/15/16	(15.00)	(30.50)	99,190 \$	(3,025,282)
17	NGPL - Sequent / Emera	7/1/2016	7/31/2016	(15.50)	09/12/16	(43.00)	(58.50)	90,480 \$	(5,293,071)
18	Ozark - Pipeline	7/1/2016	7/31/2016	(15.50)	08/22/16	(22.00)	(37.50)	89,820 \$	(3,368,250)
19	PEPL - BP Energy	7/1/2016	7/31/2016	(15.50)	08/25/16	(25.00)	(40.50)	75,180 \$	(3,044,776)
20	PEPL - Laclede	7/1/2016	7/31/2016	(15.50)	08/25/16	(25.00)	(40.50)	450,599 \$	(18,249,251)
21	PEPL - Pipeline	7/1/2016	7/31/2016	(15.50)	08/22/16	(22.00)	(37.50)	171,703 \$	(6,438,870)
22	Southern Star - Pipeline	7/1/2016	7/31/2016	(15.50)	08/15/16	(15.00)	(30.50)	5,769 \$	(175,939)
23	Southern Star - Sequent / Atm	7/1/2016	7/31/2016	(15.50)	08/25/16	(25.00)	(40.50)	1,500 \$	(60,750)
24	TETCO - Pipeline	7/1/2016	7/31/2016	(15.50)	08/22/16	(22.00)	(37.50)	217,531 \$	(8,157,430)
25	TETCO - Twin Eagle	7/1/2016	7/31/2016	(15.50)	08/25/16	(25.00)	(40.50)	438,928 \$	(17,776,580)
26	ANR	8/1/2016	8/31/2016	(15.50)	09/26/16	(26.00)	(41.50)	169,275 \$	(7,024,923)
27	MRT - Centerpoint	8/1/2016	8/31/2016	(15.50)	09/29/16	(29.00)	(44.50)	186,628 \$	(8,304,934)
28	NGPL - Pipeline	8/1/2016	8/31/2016	(15.50)	09/19/16	(19.00)	(34.50)	102,059 \$	(3,521,024)
29	NGPL - Sequent / Emera	8/1/2016	8/31/2016	(15.50)	09/26/16	(26.00)	(41.50)	77,453 \$	(3,214,296)
30	Ozark - Pipeline	8/1/2016	8/31/2016	(15.50)	09/20/16	(20.00)	(35.50)	89,802 \$	(3,187,965)
31	PEPL - BP Energy	8/1/2016	8/31/2016	(15.50)	09/26/16	(26.00)	(41.50)	116,398 \$	(4,830,524)
32	PEPL - Laclede	8/1/2016	8/31/2016	(15.50)	09/26/16	(26.00)	(41.50)	463,973 \$	(19,254,879)
33	PEPL - Pipeline	8/1/2016	8/31/2016	(15.50)	09/21/16	(21.00)	(36.50)	175,170 \$	(6,393,689)
34	Southern Star - Pipeline	8/1/2016	8/31/2016	(15.50)	09/19/16	(19.00)	(34.50)	5,820 \$	(200,791)
35	Southern Star - Sequent / Atm	8/1/2016	8/31/2016	(15.50)	09/26/16	(26.00)	(41.50)	1,500 \$	(62,250)
36	TETCO - Pipeline	8/1/2016	8/31/2016	(15.50)	09/20/16	(20.00)	(35.50)	218,252 \$	(7,747,929)
37	TETCO - Twin Eagle	8/1/2016	8/31/2016	(15.50)	09/26/16	(26.00)	(41.50)	371,207 \$	(15,405,091)
38	Twin Eagle	8/1/2016	8/31/2016	(15.50)	09/26/16	(26.00)	(41.50)	127,361 \$	(5,285,470)

LEAD/LAG STUDY WORKPAPERS

Schedule TSL-3 (Tab B)

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Purchased Gas Costs

Line	Supplier	Production Month Start Service	Production Month Finish Service	Service Lag	Date Paid	Payment Lag	Total Lag	Amount	Dollar Days
39	ANR - Pipeline	9/1/2016	9/30/2016	(15.00)	10/24/16	(24.00)	(39.00)	169,275 \$	(6,601,735)
40	PEPL - Laclede/Spire	9/1/2016	9/30/2016	(15.00)	10/25/16	(25.00)	(40.00)	481,860 \$	(19,274,414)
41	NGPL - Emera/Centerpoint/So	9/1/2016	9/30/2016	(15.00)	10/25/16	(25.00)	(40.00)	85,197 \$	(3,407,867)
42	Ozark - Pipeline	9/1/2016	9/30/2016	(15.00)	10/18/16	(18.00)	(33.00)	89,975 \$	(2,969,164)
43	PEPL - BP Energy	9/1/2016	9/30/2016	(15.00)	10/31/16	(31.00)	(46.00)	81,898 \$	(3,767,317)
44	PEPL - Pipeline	9/1/2016	9/30/2016	(15.00)	10/21/16	(21.00)	(36.00)	183,595 \$	(6,609,426)
45	Southern Star - Atmos Energy	9/1/2016	9/30/2016	(15.00)	10/28/16	(28.00)	(43.00)	1,500 \$	(64,500)
46	Southern Star - Pipeline	9/1/2016	9/30/2016	(15.00)	10/17/16	(17.00)	(32.00)	5,669 \$	(181,411)
47	TETCO - Pipeline	9/1/2016	9/30/2016	(15.00)	10/18/16	(18.00)	(33.00)	218,679 \$	(7,216,422)
48	TETCO - Twin Eagle	9/1/2016	9/30/2016	(15.00)	10/25/16	(25.00)	(40.00)	635,078 \$	(25,403,132)
49	MRT - Centerpoint	9/1/2016	9/30/2016	(15.00)	10/28/16	(28.00)	(43.00)	68,517 \$	(2,946,223)
50	ANR - Pipeline	10/1/2016	10/31/2016	(15.50)	11/25/16	(25.00)	(40.50)	169,275 \$	(6,855,648)
51	PEPL - Laclede/Spire	10/1/2016	10/31/2016	(15.50)	11/25/16	(25.00)	(40.50)	467,694 \$	(18,941,589)
52	NGPL - Emera/Centerpoint/So	10/1/2016	10/31/2016	(15.50)	11/29/16	(29.00)	(44.50)	96,821 \$	(4,308,551)
53	Ozark - Pipeline	10/1/2016	10/31/2016	(15.50)	11/21/16	(21.00)	(36.50)	89,802 \$	(3,277,767)
54	PEPL - BP Energy	10/1/2016	10/31/2016	(15.50)	11/28/16	(28.00)	(43.50)	179,510 \$	(7,808,696)
55	TETCO - Twin Eagle	10/1/2016	10/31/2016	(15.50)	11/25/16	(25.00)	(40.50)	809,624 \$	(32,789,774)
56	PEPL - Pipeline	10/1/2016	10/31/2016	(15.50)	11/21/16	(21.00)	(36.50)	184,879 \$	(6,748,071)
57	Southern Star - Atmos Energy	10/1/2016	10/31/2016	(15.50)	11/25/16	(25.00)	(40.50)	1,500 \$	(60,750)
58	Southern Star - Pipeline	10/1/2016	10/31/2016	(15.50)	11/14/16	(14.00)	(29.50)	5,908 \$	(174,274)
59	TETCO - Pipeline	10/1/2016	10/31/2016	(15.50)	11/21/16	(21.00)	(36.50)	217,263 \$	(7,930,103)
60	MRT - Centerpoint	10/1/2016	10/31/2016	(15.50)	11/28/16	(28.00)	(43.50)	254,556 \$	(11,073,176)
61	MRT - Centerpoint	11/1/2016	11/30/2016	(15.00)	12/29/16	(29.00)	(44.00)	209,671 \$	(9,225,539)
62	NGPL - Emera/Centerpoint/So	11/1/2016	11/30/2016	(15.00)	01/03/17	(34.00)	(49.00)	40,277 \$	(1,973,594)
63	Ozark - Pipeline	11/1/2016	11/30/2016	(15.00)	12/20/16	(20.00)	(35.00)	89,975 \$	(3,149,114)
64	PEPL - BP Energy	11/1/2016	11/30/2016	(15.00)	01/03/17	(34.00)	(49.00)	121,078 \$	(5,932,809)
65	PEPL - Laclede/Spire	11/1/2016	11/30/2016	(15.00)	12/27/16	(27.00)	(42.00)	419,944 \$	(17,637,661)
66	PEPL - Pipeline	11/1/2016	11/30/2016	(15.00)	12/21/16	(21.00)	(36.00)	227,882 \$	(8,203,749)
67	Southern Star - Atmos Energy	11/1/2016	11/30/2016	(15.00)	12/27/16	(27.00)	(42.00)	1,500 \$	(63,000)
68	Southern Star - Pipeline	11/1/2016	11/30/2016	(15.00)	12/16/16	(16.00)	(31.00)	5,744 \$	(178,052)
69	TETCO - Pipeline	11/1/2016	11/30/2016	(15.00)	12/20/16	(20.00)	(35.00)	232,402 \$	(8,134,054)
70	TETCO - Twin Eagle	11/1/2016	11/30/2016	(15.00)	12/27/16	(27.00)	(42.00)	451,004 \$	(18,942,150)
71	ANR - Pipeline	11/1/2016	11/30/2016	(15.00)	12/23/16	(23.00)	(38.00)	208,140 \$	(7,909,312)
72	ANR - Twin Eagle	11/1/2016	11/30/2016	(15.00)	11/27/16	(27.00)	(42.00)	106,947 \$	(4,491,754)
73	ANR - Pipeline	12/1/2016	12/31/2016	(15.50)	01/23/17	(23.00)	(38.50)	90,018 \$	(3,465,695)
74	MRT - Centerpoint	12/1/2016	12/31/2016	(15.50)	02/06/17	(37.00)	(52.50)	83,992 \$	(4,409,598)
75	NGPL - Emera/Centerpoint/So	12/1/2016	12/31/2016	(15.50)	01/25/17	(25.00)	(40.50)	192,499 \$	(7,796,216)
76	Ozark - Pipeline	12/1/2016	12/31/2016	(15.50)	01/20/17	(20.00)	(35.50)	89,802 \$	(3,187,965)

LEAD/LAG STUDY WORKPAPERS

Schedule TSL-3 (Tab B)

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Purchased Gas Costs

Line	Supplier	Production Month Start Service	Production Month Finish Service	Service Lag	Date Paid	Payment Lag	Total Lag	Amount	Dollar Days
77	PEPL - BP Energy	12/1/2016	12/31/2016	(15.50)	01/25/17	(25.00)	(40.50)	216,892	\$ (8,784,109)
78	TETCO - Twin Eagle	12/1/2016	12/31/2016	(15.50)	01/25/17	(25.00)	(40.50)	1,122,220	\$ (45,449,907)
79	PEPL - Pipeline	12/1/2016	12/31/2016	(15.50)	01/23/17	(23.00)	(38.50)	274,231	\$ (10,557,876)
80	Southern Star - Atmos Energy	12/1/2016	12/31/2016	(15.50)	01/25/17	(25.00)	(40.50)	1,500	\$ (60,750)
81	Southern Star - Pipeline	12/1/2016	12/31/2016	(15.50)	01/19/17	(19.00)	(34.50)	5,902	\$ (203,612)
82	TETCO - Pipeline	12/1/2016	12/31/2016	(15.50)	01/20/17	(20.00)	(35.50)	234,500	\$ (8,324,733)
83	Southern Star - Atmos Energy	12/1/2016	12/31/2016	(15.50)	01/25/17	(25.00)	(40.50)	558,817	\$ (22,632,071)
84	ANR - Pipeline	1/1/2017	1/31/2017	(15.50)	02/23/17	(23.00)	(38.50)	208,140	\$ (8,013,382)
85	MRT - Centerpoint	1/1/2017	1/31/2017	(15.50)	03/03/17	(31.00)	(46.50)	83,181	\$ (3,867,931)
86	NGPL - Emera/Centerpoint/So	1/1/2017	1/31/2017	(15.50)	02/24/17	(24.00)	(39.50)	242,211	\$ (9,567,321)
87	Ozark - Pipeline	1/1/2017	1/31/2017	(15.50)	02/21/17	(21.00)	(36.50)	89,802	\$ (3,277,767)
88	PEPL - BP Energy	1/1/2017	1/31/2017	(15.50)	02/27/17	(27.00)	(42.50)	275,152	\$ (11,693,968)
89	PEPL - Laclede/Spire	1/1/2017	1/31/2017	(15.50)	02/27/17	(27.00)	(42.50)	631,464	\$ (26,837,222)
90	PEPL - Pipeline	1/1/2017	1/31/2017	(15.50)	02/21/17	(21.00)	(36.50)	276,656	\$ (10,097,953)
91	Southern Star - Atmos Energy	1/1/2017	1/31/2017	(15.50)	02/27/17	(27.00)	(42.50)	20,864	\$ (886,730)
92	Southern Star - Atmos Energy	1/1/2017	1/31/2017	(15.50)	03/03/17	(31.00)	(46.50)	1,500	\$ (69,750)
93	Southern Star - Pipeline	1/1/2017	1/31/2017	(15.50)	02/13/17	(13.00)	(28.50)	5,776	\$ (164,625)
94	TETCO - Pipeline	1/1/2017	1/31/2017	(15.50)	02/21/17	(21.00)	(36.50)	233,779	\$ (8,532,946)
95	TETCO - Twin Eagle	1/1/2017	1/31/2017	(15.50)	02/27/17	(27.00)	(42.50)	1,155,460	\$ (49,107,053)
96	ANR - Pipeline	2/1/2017	2/28/2017	(14.00)	03/23/17	(23.00)	(37.00)	208,140	\$ (7,701,172)
97	ANR - Twin Eagle	2/1/2017	2/28/2017	(14.00)	03/27/17	(27.00)	(41.00)	160,790	\$ (6,592,393)
98	MRT - Centerpoint	2/1/2017	2/28/2017	(14.00)	03/31/17	(31.00)	(45.00)	290,324	\$ (13,064,594)
99	NGPL - Emera/Centerpoint/So	2/1/2017	2/28/2017	(14.00)	03/24/17	(24.00)	(38.00)	130,410	\$ (4,955,586)
100	Ozark - Pipeline	2/1/2017	2/28/2017	(14.00)	03/20/17	(20.00)	(34.00)	90,320	\$ (3,070,893)
101	PEPL - BP Energy	2/1/2017	2/28/2017	(14.00)	03/27/17	(27.00)	(41.00)	81,677	\$ (3,348,762)
102	PEPL - Laclede/Spire	2/1/2017	2/28/2017	(14.00)	03/27/17	(27.00)	(41.00)	401,012	\$ (16,441,507)
103	PEPL - Pipeline	2/1/2017	2/28/2017	(14.00)	03/21/17	(21.00)	(35.00)	247,450	\$ (8,660,747)
104	Southern Star - Atmos Energy	2/1/2017	2/28/2017	(14.00)	03/27/17	(27.00)	(41.00)	15,487	\$ (634,970)
105	Southern Star - Atmos Energy	2/1/2017	2/28/2017	(14.00)	05/19/17	(80.00)	(94.00)	1,500	\$ (141,000)
106	Southern Star - Pipeline	2/1/2017	2/28/2017	(14.00)	03/16/17	(16.00)	(30.00)	5,198	\$ (155,940)
107	TETCO - Pipeline	2/1/2017	2/28/2017	(14.00)	03/20/17	(20.00)	(34.00)	233,432	\$ (7,936,687)
108	TETCO - Twin Eagle	2/1/2017	2/28/2017	(14.00)	03/27/17	(27.00)	(41.00)	625,053	\$ (25,627,164)
109	ANR - Pipeline	3/1/2017	3/31/2017	(15.50)	04/24/17	(24.00)	(39.50)	208,140	\$ (8,221,521)
110	MRT - Centerpoint	3/1/2017	3/31/2017	(15.50)	05/01/17	(31.00)	(46.50)	224,044	\$ (10,418,045)
111	NGPL - Emera/Centerpoint/So	3/1/2017	3/31/2017	(15.50)	04/25/17	(25.00)	(40.50)	87,241	\$ (3,533,267)
112	Ozark - Pipeline	3/1/2017	3/31/2017	(15.50)	04/20/17	(20.00)	(35.50)	89,802	\$ (3,187,965)
113	PEPL - BP Energy	3/1/2017	3/31/2017	(15.50)	04/25/17	(25.00)	(40.50)	81,055	\$ (3,282,718)
114	PEPL - Laclede/Spire	3/1/2017	3/31/2017	(15.50)	04/25/17	(25.00)	(40.50)	284,898	\$ (11,538,362)

LEAD/LAG STUDY WORKPAPERS

Schedule TSL-3 (Tab B)

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Purchased Gas Costs

Line	Supplier	Production Month Start Service	Production Month Finish Service	Service Lag	Date Paid	Payment Lag	Total Lag	Amount	Dollar Days
115	PEPL - Pipeline	3/1/2017	3/31/2017	(15.50)	04/21/17	(21.00)	(36.50)	242,496 \$	(8,851,086)
116	Southern Star - Atmos Energy	3/1/2017	3/31/2017	(15.50)	04/25/17	(25.00)	(40.50)	8,378 \$	(339,324)
117	Southern Star - Atmos Energy	3/1/2017	3/31/2017	(15.50)	04/27/17	(27.00)	(42.50)	1,500 \$	(63,750)
118	Southern Star - Pipeline	3/1/2017	3/31/2017	(15.50)	04/17/17	(17.00)	(32.50)	5,724 \$	(186,017)
119	TETCO - Pipeline	3/1/2017	3/31/2017	(15.50)	04/20/17	(20.00)	(35.50)	228,067 \$	(8,096,385)
120	TETCO - Twin Eagle	3/1/2017	3/31/2017	(15.50)	04/25/17	(25.00)	(40.50)	270,234 \$	(10,944,472)
121	ANR - Pipeline	4/1/2017	4/30/2017	(15.00)	05/22/17	(22.00)	(37.00)	168,921 \$	(6,250,094)
122	TETCO - Twin Eagle	4/1/2017	4/30/2017	(15.00)	05/25/17	(25.00)	(40.00)	809,878 \$	(32,395,114)
123	MRT - Centerpoint	4/1/2017	4/30/2017	(15.00)	06/12/17	(43.00)	(58.00)	111,659 \$	(6,476,242)
124	Ozark - Pipeline	4/1/2017	4/30/2017	(15.00)	05/22/17	(22.00)	(37.00)	89,975 \$	(3,329,063)
125	PEPL - BP Energy	4/1/2017	4/30/2017	(15.00)	05/25/17	(25.00)	(40.00)	214,132 \$	(8,565,288)
126	PEPL - Laclede/Spire	4/1/2017	4/30/2017	(15.00)	05/25/17	(25.00)	(40.00)	605,430 \$	(24,217,202)
127	PEPL - Pipeline	4/1/2017	4/30/2017	(15.00)	05/22/17	(22.00)	(37.00)	193,681 \$	(7,166,206)
128	Southern Star - Atmos Energy	4/1/2017	4/30/2017	(15.00)	05/26/17	(26.00)	(41.00)	132,994 \$	(5,452,748)
129	Southern Star - Pipeline	4/1/2017	4/30/2017	(15.00)	05/15/17	(15.00)	(30.00)	5,529 \$	(165,874)
130	TETCO - Pipeline	4/1/2017	4/30/2017	(15.00)	05/22/17	(22.00)	(37.00)	217,307 \$	(8,040,368)
131	ANR - Pipeline	5/1/2017	5/31/2017	(15.50)	06/23/17	(23.00)	(38.50)	168,921 \$	(6,503,476)
132	ANR - Twin Eagle	5/1/2017	5/31/2017	(15.50)	06/26/17	(26.00)	(41.50)	291,063 \$	(12,079,120)
133	Ozark - Pipeline	5/1/2017	5/31/2017	(15.50)	06/20/17	(20.00)	(35.50)	89,802 \$	(3,187,965)
134	PEPL - BP Energy	5/1/2017	5/31/2017	(15.50)	06/26/17	(26.00)	(41.50)	154,489 \$	(6,411,311)
135	PEPL - Laclede/Spire	5/1/2017	5/31/2017	(15.50)	06/26/17	(26.00)	(41.50)	498,959 \$	(20,706,783)
136	PEPL - Pipeline	5/1/2017	5/31/2017	(15.50)	06/21/17	(21.00)	(36.50)	182,473 \$	(6,660,254)
137	Southern Star - Atmos Energy	5/1/2017	5/31/2017	(15.50)	06/27/17	(27.00)	(42.50)	130,182 \$	(5,532,724)
138	Southern Star - Pipeline	5/1/2017	5/31/2017	(15.50)	06/16/17	(16.00)	(31.50)	5,716 \$	(180,058)
139	TETCO - Pipeline	5/1/2017	5/31/2017	(15.50)	06/20/17	(20.00)	(35.50)	216,199 \$	(7,675,056)
140	TETCO - Twin Eagle	5/1/2017	5/31/2017	(15.50)	06/27/17	(27.00)	(42.50)	348,963 \$	(14,830,909)
141			Total					\$ 27,478,668	(1,102,937,692)
142			Total (Lead)/Lag-Days	(40.14)					

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
O&M Expenses

Line	Description	(Lead)/Lag Days	Reference
1	<u>Operation and Maintenance Expenses</u>		
2	O&M, Labor	(13.00)	C-1
3	Pension Expense	(51.38)	C-2
4	OPEB	(167.00)	C-3
5	Medical and Dental Expenses	12.92	C-4
6	Uncollectibles	0.00	
7	O&M, Other Non-Labor	(28.82)	C-5
8	Affiliate Expenses	(42.50)	C-6
9	<u>Total O&M Expenses</u>		

LEAD/LAG STUDY WORKPAPERS

Schedule TSL-2 Summary (NEMO)

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Cash Working Capital Requirement
Summary (NEMO)

Line	Description	Revenue Requirement Amount	Average Daily Amount	Revenue Lag	Ref.	Expense Lag	Ref.	Net (Lead)/Lag Days	Working Capital Requirement
	<u>Gas Supply Expense</u>								
1	Purchased Gas Costs	\$ 7,914,702	21,684	49.62	A	(40.14)	B	9.48	205,605
2									
3	<u>Operation and Maintenance Expenses</u>								
4	O&M, Labor	\$ 1,578,600	4,325	49.62	A	(13.00)	C	36.62	158,378
5	Pension Expense	\$ 116,160	318	49.62	A	(51.38)	C	(1.76)	(559)
6	OPEB	\$ 101,763	279	49.62	A	(167.00)	C	(117.38)	(32,726)
7	Medical and Dental Expenses	\$ 340,111	932	49.62	A	12.92	C	62.54	58,274
8	Uncollectibles	\$ 225,893	619	49.62	A	0.00		49.62	30,709
9	Affiliate Expenses	\$ 791,621	2,169	49.62	A	(42.50)	C	7.12	15,442
10	O&M, Other Non-Labor	\$ 1,396,278	3,825	49.62	A	(28.82)	C	20.80	79,556
11	<u>Total O&M Expenses</u>	\$ 4,550,426							\$ 309,074
12									
13	<u>Taxes Other Than Income Taxes</u>								
14	Ad Valorem	\$ 698,141	1,913	49.62	A	(169.85)	E	(120.23)	(229,960)
15	Payroll Taxes	\$ 132,206	362	49.62	A	(13.48)	E	36.14	13,089
16	PSC Assessment	\$ 49,578	136	49.62	A	41.13	E	90.74	12,326
17	DOT	\$ -	-	49.62	A	(55.66)	E	(6.04)	-
18	<u>Total Taxes Other Than Income Taxes</u>	\$ 879,925							\$ (204,545)
19									
20	Federal Income Tax	\$ 484,117	1,326	49.62	A	(37.99)	D-1	11.63	15,425
21	State Income Tax	\$ 76,076	208	49.62	A	(37.99)	D-2	11.63	2,424
22	Interest Payments	\$ 922,776	2,528	49.62	A	(91.00)	F	(41.38)	(104,616)
23	Sales Tax	\$ -	-	49.62	A	(13.45)	G	36.17	-
24									
25	<u>Total</u>	\$ 14,828,022	40,625						\$ 223,368

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Federal Income Taxes

Line	Description	Service Period Start	Service Period End	Midpoint of Service Period	Payment Date	Percent of Taxes Due	(Lead)/Lag Days		
							Days from Midpoint to Payment Date	(Lead)/Lag Days	
1	Third Quarter	1/1/2016	12/31/2016	(183.00)	9/15/2016	25.00%	(76.00)	(19.00)	
2	Fourth Quarter	1/1/2016	12/31/2016	(183.00)	12/15/2016	25.00%	(167.00)	(41.75)	
3	First Quarter	1/1/2017	12/31/2017	(182.50)	4/18/2017	25.00%	74.50	18.63	
4	Second Quarter	1/1/2017	12/31/2017	(182.50)	6/15/2017	25.00%	16.50	4.13	
5	<u>Federal Income Tax (Lead)/Lag Days</u>							<u>(37.99)</u>	

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
State Income Taxes

Line	Description	Service Period Start	Service Period End	Midpoint of Service Period	Payment Date	Percent of Taxes Due	(Lead)/Lag Days		
							Days from Midpoint to Payment Date	(Lead)/Lag Days	
1	Third Quarter	1/1/2016	12/31/2016	(183.00)	9/15/2016	25.00%	(76.00)	(19.00)	
2	Fourth Quarter	1/1/2016	12/31/2016	(183.00)	12/15/2016	25.00%	(167.00)	(41.75)	
3	First Quarter	1/1/2017	12/31/2017	(182.50)	4/18/2017	25.00%	74.50	18.63	
4	Second Quarter	1/1/2017	12/31/2017	(182.50)	6/15/2017	25.00%	16.50	4.13	
5	<u>Federal Income Tax (Lead)/Lag Days</u>							<u>(37.99)</u>	

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Taxes Other Than Income Taxes

Line	Description	Expense	(Lead)/Lag Days	Reference	Dollar Days
1	<u>Payroll Taxes</u>				
2	FICA	\$ 7,092,826	(12.00)	E-1	\$ (85,082,461)
2	Federal Unemployment	77,947	(76.24)	E-2	(5,942,955)
3	State Unemployment	89,836	(76.43)	E-3	(6,866,550)
4	<u>Total Payroll Taxes</u>	\$ 7,260,610	(13.48)		\$ (97,891,967)
5	<u>Ad Valorem</u>	\$ 1,483,307	(169.85)	E-4	\$ (251,934,715)
6	PSC Assessment	127,663	41.13	E-5	5,250,129
7	DOT	71,153	(55.66)	E-6	(3,960,082)
8	<u>Total Taxes Other Than Income Taxes</u>	\$ 8,942,732	(38.97)		\$ (348,536,635)

LEAD/LAG STUDY WORKPAPERS

Schedule TSL-3 (Tab F)

Liberty Utilities Missouri
 Lead-Lag Study Ending June 30, 2017
 Interest Expense Payment

Line	Description	Service Period Begin	Service Period End	Midpoint of Service Period	Payment Date	Amount	Lead-Lag Days	Dollar-Days	Composite Lead-Lag Days
1	Internal Transfer to LU Co 1/30/2016 - 7/30/2016	1/30/2016	7/30/2016	(91.50)	7/29/2016	\$ 1,216,960	(90.50)	\$ (110,134,880)	
2	Internal Transfer to LU Co 8/1/2016 - 1/30/2017	8/1/2016	1/30/2017	(91.50)	1/30/2017	\$ 1,216,960	(91.50)	\$ (111,351,840)	
3	<u>Subtotal</u>					\$ 2,433,920		\$ (221,486,720)	(91.00)

LEAD/LAG STUDY WORKPAPERS

Schedule TSL-3 (Tab G)

Liberty Utilities Missouri
Lead-Lag Study Ending June 30, 2017
Sales Tax

Line	Description	Service Period Start	Service Period End	Midpoint	Initial Payment Date	Payment	Payment (Lead)/Lag Days	True-Up Payment Date	Payment	(Lead)/Lag Days
1	July 2016	7/1/2016	7/31/2016	(15.50)	7/5/2016	\$ 41,040	10.50	8/17/16	\$ 202	(32.50)
2	August 2016	8/1/2016	8/31/2016	(15.50)	8/2/2016	\$ 41,040	13.50	9/20/16	\$ 4,416	(35.50)
3	September 2016	9/1/2016	9/30/2016	(15.00)	9/1/2016	\$ 41,040	14.00	10/28/16	\$ 4,615	(43.00)
4	October 2016	10/1/2016	10/31/2016	(15.50)	10/3/2016	\$ 41,040	12.50	11/21/16	\$ 14,603	(36.50)
5	November 2016	11/1/2016	11/30/2016	(15.00)	11/3/2016	\$ 41,040	12.00	12/20/16	\$ 20,906	(35.00)
6	December 2016	12/1/2016	12/31/2016	(15.50)	12/2/2016	\$ 41,040	13.50	1/27/17	\$ 77,799	(42.50)
7	January 2017	1/1/2017	1/31/2017	(15.50)	1/6/2017	\$ 41,040	9.50	2/22/17	\$ 139,610	(37.50)
8	February 2017	2/1/2017	2/28/2017	(14.00)	2/1/2017	\$ 36,840	13.00	3/16/17	\$ 101,715	(30.00)
9	March 2017	3/1/2017	3/31/2017	(15.50)	3/1/2017	\$ 36,840	14.50	4/26/17	\$ 86,315	(41.50)
10	April 2017	4/1/2017	4/30/2017	(15.00)	4/3/2017	\$ 36,840	12.00	5/16/17	\$ 40,980	(31.00)
11	May 2017	5/1/2017	5/31/2017	(15.50)	5/3/2017	\$ 36,840	12.50	6/20/17	\$ 24,450	(35.50)
12	June 2017	6/1/2017	6/30/2017	(15.00)	6/1/2017	\$ 36,840	14.00	7/21/17	\$ 12,069	(36.00)
13	Total					\$ 471,480	12.60		\$ 527,679	(36.72)
14	Total						47%		53%	(13.45)

AFFIDAVIT OF TIMOTHY S. LYONS

COMMONWEALTH OF MASSACHUSETTS)
) ss
COUNTY OF WORCESTER)

On the 28 day of September, 2017, before me appeared Timothy S. Lyons, to me personally known, who, being by me first duly sworn, states that he a partner at ScottMadden, Inc and acknowledges that he has read the above and foregoing document and believes that the statements therein are true and correct to the best of his information, knowledge and belief.

Timothy S. Lyons

Timothy S. Lyons

Subscribed and sworn to before me this 28 day of September, 2017.

[Signature]

Notary Public

My commission expires: March 11, 2022

