Exhibit No.:
Issue: *WNAR tariff*
Witness: *Michael L. Stahlman*
Sponsoring Party: *MO PSC Staff*
Type of Exhibit: *Direct Testimony*
Case Nos.: *GO-2019-0058*
GO-2019-0059
Date Testimony Prepared: *November 15, 2018*

MISSOURI PUBLIC SERVICE COMMISSION

COMMISSION STAFF DIVISION

TARIFF/RATE DESIGN

DIRECT TESTIMONY

OF

MICHAEL L. STAHLMAN

SPIRE MISSOURI INC., d/b/a SPIRE

CASE NOS. GO-2019-0058 and GO-2019-0059

Staff Exhibit No. 202
Date 1-15-19 Reporter BYLF
File No. GO-2019-0058
GO-2019-0059

Jefferson City, Missouri
November 2018

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1	**DIRECT TESTIMONY**
2	**OF**
3	**MICHAEL L. STAHLMAN**
4	**SPIRE MISSOURI INC., d/b/a SPIRE**
5	**CASE NOS. GO-2019-0058 and GO-2019-0059**
6	Q. Please state your name and business address.
7	A. My name is Michael L. Stahlman, and my business address is Missouri Public
8	Service Commission, P.O. Box 360, Jefferson City, Missouri, 65102.
9	Q. By whom are you employed and in what capacity?
10	A. I am employed by the Missouri Public Service Commission ("Commission")
11	as a Regulatory Economist III in the Tariff/Rate Design Department.
12	Q. Please describe your educational and work background.
13	A. Please see Schedule MLS-d1.
14	Q. What is the purpose of your testimony?
15	A. The purpose of my testimony is to explain why Staff recommends rejection of
16	Spire Missouri Inc., d/b/a Spire's ("Spire") proposed Weather Normalization Adjustment
17	Rider ("WNAR") rates for both its Spire Missouri East and Spire Missouri West divisions,
18	filed on August 31, 2018. Briefly, Staff is recommending rejection because Spire ranks the
19	normal weather to 2016 actual weather, when Spire's tariff requires the normal weather to be
20	ranked to the actual weather of the accumulation period, which in this case is April through
21	July of 2018. Instead of the WNAR rates filed by Spire, the appropriate WNAR rates should
22	be $(0.00050) and $0.00084 for Spire Missouri East and Spire Missouri West, respectively.
23	Staff further recommends the Commission order Spire to use Staff's ranked method for

1   calculating WNAR rate adjustments in future WNAR filings, to be consistent with the WNAR

2   tariff language. This ranked method is discussed below and in the testimony of Staff witness

3   Dr. Won.

4   Q.   What tariff language specifies how the normal heating degree days ("NDD")

5   are to be calculated?

6   A.   Tariff Sheet No. 13 for both Spire Missouri East and Spire Missouri West

7   define NDD as "the total normal heating degree days based upon Staff's daily normal weather

8   as determined in the most recent rate case."

9   Q.   Does the tariff language require Spire to use the same ranking that was used in

10   the most recent rate cases?

11   A.   No. The tariff language specifies that the degree days be "based upon Staff's

12   daily normal weather *as determined* in the most recent rate case", not the daily normal

13   weather in the most recent rate case. Staff's ranked method is how Staff's daily normal

14   weather was determined in the most recent rate case. The tariff language was written thus

15   because Staff's ranked method requires the normal weather to be ranked consistent with the

16   actual weather of the period. The words "based upon" also allow Spire to properly account

17   for February 29th, as the test period in the last rate case was during a leap year. Staff witness

18   Dr. Won further discusses the ranked method.

19   Q.   Why did the tariff language not include "method" to state "based upon Staff's

20   daily normal weather *method*"?

21   A.   The inclusion of the word "method" could imply that Spire would need to

22   recalculate normal weather by rolling the 30 year period forward to the current period.

23   However, it is important to maintain the 30 year normal period that was established in the

1   rate case because that was the basis for the coefficient ("β") used in Spire's tariffs; changing

2   the period would change the relationship between the calculated normal weather and natural

3   gas usage.

4   Q.   What is the impact of Spire's method of maintaining a 2016 rank?

5   A.   Spire's method increases the volatility of the WNAR adjustment, which will

6   also result in an inaccurate adjustment. This is demonstrated in the attached worksheet,

7   Schedule MLS-d2. In that worksheet, I assumed a scenario where the actual weather's

8   heating degree days was exactly the same as the normal weather established in Spire's last

9   rate case, but I rearranged the order of those days so the hypothetical actual weather was

10   coldest at the beginning of the first month then coldest at the end of a second month.

11   Maintaining the 2016 ranking would result in a large adjustment for that billing cycle, while

12   appropriately re-ranking the normals resulted in no adjustment since the overall hypothetical

13   actual weather was the same as the normal weather.

14   Q.   Can you provide a simplified example of the scenario discussed in that

15   worksheet?

16   A.   Yes. Table 1 below provides a simplified version of the scenario above for

17   just two days. Postulate that the 2016 heating degree day normal for day 1 is 10

18   (meaning, the average daily temperature was 55 degrees) and the heating degree day normal

19   for day 2 is 5 (meaning, the average daily temperature was 60 degrees). Now postulate that

20   the actual heating degree days for day 1 and day 2 is 5 and 10 respectively. Under Spire's

21   method, day 1 requires an adjustment of 5 degree days and day 2 requires an adjustment of -5.

22   However, if the normals are properly re-ranked, there is no adjustment necessary for

23   either day.

1

Table 1: Simple Comparison of Hypothetical Cycle where the Actual Weather is the Same as Normal, but in a Different Order

	30-Year Mean Daily Temperature from Test Year of Rate Case	Normal HDD ("NDD") from Test Year of Rate Case	Actual Daily Mean Temperature for Current WNAR Period	Actual HDD ("ADD")	Spire's (NDD-ADD)	Normal HDD Ranked for Current WNAR Period	(NDD-ADD) per Tariff
Day 1	55	10	60	5	5	5	-
Day 2	60	5	55	10	-5	10	-

2

3   Q.   Wouldn't the plus five and minus five cancel out in the simple comparison

4   above?

5   A.   Potentially, but in the more realistic scenario it would be unlikely. This is

6   because Spire has 18 billing cycles in a given calendar month, which means that the Day 1

7   and Day 2 for some of the customers would be in different billing cycles. The attached

8   worksheet, Schedule MLS-d3, shows this scenario in further detail. However, even though

9   the (NDD-ADD) values would be negated, the calculated WNAR rate would be incorrect if

10 there is any customer entering or leaving the system.

11 Q.   Could Spire's method result in a correctly calculated WNAR?

12 A.   Potentially, but highly unlikely. The correct adjustment would only be

13 achieved if there was either no change in the rank (i.e. the 2016 rank is the exact same as the

14 2018 rank, as shown in the attached worksheet Schedule MLS-d4) or if there was no change

15 in customer counts for all bill cycles.

16 Q.   Does this conclude your testimony?

17 A.   Yes it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of Spire Missouri, Inc.	)	Case No. GO-2019-0058
d/b/a Spire's Request to Decrease WNAR	)	

and

In the Matter of Spire Missouri, Inc.'s d/b/a	)	Case No. GO-2019-0059
Spire's Request to Increase Its WNAR	)	

AFFIDAVIT OF MICHAEL L. STAHLMAN

STATE OF MISSOURI	)
	) ss.
COUNTY OF COLE	)

COMES NOW MICHAEL L. STAHLMAN and on his oath declares that he is of sound mind and lawful age; that he contributed to the foregoing *Direct Testimony*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

_____
MICHAEL L. STAHLMAN

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this ___15th___ day of November 2018.

_____
Notary Public

Michael L. Stahlman

Education

2009 M. S., Agricultural Economics, University of Missouri, Columbia, MO.

2007 B.A., Economics, Summa Cum Laude, Westminster College, Fulton, MO.

Professional Experience

2010 Regulatory Economist, Missouri Public Service Commission

2007 – 2009 Graduate Research Assistant, University of Missouri

2008 Graduate Teaching Assistant, University of Missouri

2007 American Institute for Economic Research (AIER) Summer Fellowship Program

2006 Price Analysis Intern, Food and Agricultural Policy Research Institute (FAPRI), Columbia, MO

2006 Legislative Intern for State Representative Munzlinger

2005 – 2006 Certified Tutor in Macroeconomics, Westminster College, Fulton, MO

1998 – 2004 Engineering Watch Supervisor, United States Navy

Expert Witness Testimony

Union Electric Company d/b/a AmerenUE GR-2010-0363

In the Matter of Union Electric Company d/b/a AmerenUE for Authority to File Tariffs Increasing Rates for Natural Gas Service Provided to Customers in the Company's Missouri Service Area

Union Electric Company d/b/a Ameren Missouri GT-2011-0410

In the Matter of the Union Electric Company's (d/b/a Ameren Missouri) Gas Service Tariffs Removing Certain Provisions for Rebates from Its Missouri Energy Efficient Natural Gas Equipment and Building Shell Measure Rebate Program

KCP&L Great Missouri Operations Company EO-2012-0009

In the Matter of KCP&L Greater Missouri Operations Company's Notice of Intent to File an Application for Authority to Establish a Demand-Side Programs Investment Mechanism

Union Electric Company d/b/a Ameren Missouri EO-2012-0142

In the Matter of Union Electric Company d/b/a Ameren Missouri's Filing to Implement Regulatory Changes Furtherance of Energy Efficiency as Allowed by MEEIA

Kansas City Power & Light Company EO-2012-0323

In the Matter of the Resource Plan of Kansas City Power & Light Company

KCP&L Great Missouri Operations Company EO-2012-0324

In the Matter of the Resource Plan of KCP&L Greater Missouri Operations Company

Kansas City Power & Light Company   EO-2012-0135
KCP&L Great Missouri Operations Company   EO-2012-0136
  In the Matter of the Application of Kansas City Power & Light Company [KCP&L Great Missouri Operations Company] for Authority to Extend the Transfer of Functional Control of Certain Transmission Assets to the Southwest Power Pool, Inc.

Kansas City Power & Light Company, KCP&L Great Missouri EA-2013-0098
Operations Company, and Transource Missouri   EO-2012-0367
  In the Matter of the Application of Transource Missouri, LLC for a Certificate of Convenience and Necessity Authorizing it to Construct, Finance, Own, Operate, and Maintain the Iatan-Nashua and Sibley-Nebraska City Electric Transmission Projects

Kansas City Power & Light Company   EU-2014-0077
KCP&L Great Missouri Operations Company
  In the Matter of the Application of Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company for the Issuance of an Accounting Authority Order relating to their Electrical Operations and for a Contingent Waiver of the Notice Requirement of 4 CSR 240-4.020(2)

Kansas City Power & Light Company   EO-2014-0095
  In the Matter of Kansas City Power & Light Company's Notice of Intent to File an Application for Authority To Establish a Demand-Side Programs Investment Mechanism

Veolia Energy Kansas City, Inc   HR-2014-0066
  In the Matter of Veolia Energy Kansas City, Inc for Authority to File Tariffs to Increase Rates

Grain Belt Express Clean Line, LLC   EA-2014-0207
  In the Matter of the Application of Grain Belt Express Clean Line LLC for a Certificate of Convenience and Necessity Authorizing It to Construct, Own, Operate, Control, Manage, and Maintain a High Voltage, Direct Current Transmission Line and an Associated Converter Station Providing an Interconnection on the Maywood - Montgomery 345 kV Transmission Line

Union Electric Company d/b/a Ameren Missouri   ER-2014-0258
  In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariff to Increase Its Revenues for Electric Service

Empire District Electric Company   ER-2014-0351
  In the Matter of The Empire District Electric Company for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers in the Company's Missouri Service Area

Kansas City Power & Light Company   ER-2014-0370
  In the Matter of Kansas City Power & Light Company's Request for Authority to Implement a General Rate Increase for Electric Service

cont'd Michael L. Stahlman

Kansas City Power & Light Company   EO-2014-0240
   In the Matter of Kansas City Power & Light Company's Filing for Approval of
   Demand-Side Programs and for Authority to Establish a Demand-Side Programs
   Investment Mechanism

KCP&L Great Missouri Operations Company   EO-2014-0241
   In the Matter of KCP&L Greater Missouri Operations Company's Filing for
   Approval of Demand-Side Programs and for Authority to Establish a Demand-Side
   Programs Investment Mechanism

Ameren Transmission Company of Illinois   EA-2015-0146
   In the Matter of the Application of Ameren Transmission Company of Illinois for
   Other Relief or, in the Alternative, a Certificate of Public Convenience and
   Necessity Authorizing it to Construct, Install, Own, Operate, Maintain and
   Otherwise Control and Manage a 345,000-volt Electric Transmission Line from
   Palmyra, Missouri to the Iowa Border and an Associated Substation Near
   Kirksville, Missouri

Empire District Electric Company   ER-2016-0023
   In the Matter of The Empire District Electric Company's Request for Authority to
   Implement a General Rate Increase for Electric Service

KCP&L Great Missouri Operations Company   ER-2016-0156
   In the Matter of KCP&L Greater Missouri Operations Company's Request for
   Authority to Implement a General Rate Increase for Electric Service

Kansas City Power & Light Company   ER-2016-0285
   In the Matter of Kansas City Power & Light Company's Request for Authority to
   Implement A General Rate Increase for Electric Service

Union Electric Company d/b/a Ameren Missouri   ER-2016-0179
   In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariff to
   Increase Its Revenues for Electric Service

Grain Belt Express Clean Line, LLC   EA-2016-0358
   In the Matter of the Application of Grain Belt Express Clean Line LLC for a
   Certificate of Convenience and Necessity Authorizing it to Construct, Own,
   Operate, Control, Manage and Maintain a High Voltage, Direct Current
   Transmission Line and an Associated Converter Station Providing an
   Interconnection on the Maywood-Montgomery 345kV transmission line.

Spire Missouri, Inc.   GR-2017-0215 and GR-2017-0216
   In the Matter of Spire Missouri, Inc.'s Request to Increase Its Revenues for Gas
   Service

cont'd Michael L. Stahlman

Selected Manuscripts and Posters

Stahlman, Michael and Laura M.J. McCann. "Technology Characteristics, Choice Architecture and Farmer Knowledge: The Case of Phytase." Agriculture and Human Values (2012) 29: 371-379.

Stahlman, Michael. "The Amorality of Signals." Awarded in top 50 authors for SEVEN Fund essay competition, "The Morality of Profit."

Stahlman, Michael, Laura M.J. McCann, and Haluk Gedikoglou. "Adoption of Phytase by Livestock Farmers." Selected poster at the American Agricultural Economics Association Annual Meeting, Orlando, FL, July 27-29, 2008. Also presented at the USDA/CSREES Annual Meeting in St. Louis, MO in February 2009.

McCann, Laura, Haluk Gedikoglu, Bob Broz, John Lory, Ray Massey, and Michael Stahlman. "Farm Size and Adoption of BMPs by AFOs." Selected poster at the 5th National Small Farm Conference in Springfield, IL in September 2009.

201611	2016	11	1	NORM_WX	2016 Rank	Hypothetical Actual HDD	Rank	Hypothetical NDD-ADD, Company Method	Staff Reranked Normal	Hypothetical NDD-ADD, Staff Method
201611	2016	11	1	0.82	2	39.58	30	(38.76)	39.58	-
201611	2016	11	2	0.00	1	34.21	29	(34.21)	34.21	-
201611	2016	11	3	5.24	4	31.84	28	(26.61)	31.84	-
201611	2016	11	4	8.24	6	30.21	27	(21.97)	30.21	-
201611	2016	11	5	14.00	11	28.82	26	(14.82)	28.82	-
201611	2016	11	6	15.74	13	27.51	25	(11.77)	27.51	-
201611	2016	11	7	7.01	5	26.25	24	(19.24)	26.25	-
201611	2016	11	8	11.68	9	25.29	23	(13.61)	25.29	-
201611	2016	11	9	19.25	17	24.30	22	(5.05)	24.30	-
201611	2016	11	10	18.51	16	23.37	21	(4.86)	23.37	-
201611	2016	11	11	14.96	12	22.25	20	(7.29)	22.25	-
201611	2016	11	12	23.37	21	21.16	19	2.22	21.16	-
201611	2016	11	13	22.25	20	20.15	18	2.10	20.15	-
201611	2016	11	14	12.86	10	19.25	17	(6.40)	19.25	-
201611	2016	11	15	17.62	15	18.51	16	(0.69)	18.51	-
201611	2016	11	16	9.57	7	17.82	15	(8.26)	17.82	-
201611	2016	11	17	3.13	3	16.76	14	(13.63)	16.76	-
201611	2016	11	18	10.86	8	15.74	13	(4.88)	15.74	-
201611	2016	11	19	30.21	27	14.96	12	15.25	14.96	-
201611	2016	11	20	39.58	30	14.00	11	25.58	14.00	-
201611	2016	11	21	34.21	29	12.86	10	21.35	12.86	-
201611	2016	11	22	25.29	23	11.68	9	13.61	11.68	-
201611	2016	11	23	20.15	18	10.86	8	9.29	10.86	-
201611	2016	11	24	20.82	26	9.57	7	19.25	9.57	-
201611	2016	11	25	27.51	25	8.24	6	19.27	8.24	-
201611	2016	11	26	26.25	24	7.01	5	19.24	7.01	-
201611	2016	11	27	24.30	22	5.24	4	19.07	5.24	-
201611	2016	11	28	21.16	19	3.13	3	18.02	3.13	-
201611	2016	11	29	16.76	14	0.82	2	15.95	0.82	-
201611	2016	11	30	31.84	28	-	1	31.84	-	-
201612	2016	12	1	27.46	15	5.82	1	21.64	5.82	-
201612	2016	12	2	26.82	14	11.87	2	14.95	11.87	-
201612	2016	12	3	29.80	18	14.42	3	15.37	14.42	-
201612	2016	12	4	26.23	13	16.51	4	9.72	16.51	-
201612	2016	12	5	25.55	12	18.23	5	7.32	18.23	-
201612	2016	12	6	29.02	17	19.60	6	9.42	19.60	-
201612	2016	12	7	31.75	20	20.95	7	10.80	20.95	-
201612	2016	12	8	38.37	26	22.19	8	16.17	22.19	-
201612	2016	12	9	39.75	27	22.89	9	16.86	22.89	-
201612	2016	12	10	32.82	21	23.90	10	8.92	23.90	-
201612	2016	12	11	18.23	5	24.85	11	(6.62)	24.85	-
201612	2016	12	12	30.69	19	25.55	12	5.14	25.55	-
201612	2016	12	13	34.62	23	26.23	13	8.39	26.23	-
201612	2016	12	14	41.55	28	26.82	14	14.73	26.82	-
201612	2016	12	15	44.90	29	27.46	15	17.44	27.46	-
201612	2016	12	16	36.80	25	28.15	16	8.65	28.15	-
201612	2016	12	17	35.72	24	29.02	17	6.69	29.02	-
201612	2016	12	18	56.30	31	29.80	18	26.50	29.80	-
201612	2016	12	19	49.02	30	30.69	19	18.33	30.69	-
201612	2016	12	20	33.72	22	31.75	20	1.97	31.75	-
201612	2016	12	21	28.15	16	32.82	21	(4.67)	32.82	-
201612	2016	12	22	22.89	9	33.72	22	(10.83)	33.72	-
201612	2016	12	23	24.85	11	34.62	23	(9.77)	34.62	-
201612	2016	12	24	16.51	4	35.72	24	(19.21)	35.72	-
201612	2016	12	25	11.87	2	36.80	25	(24.94)	36.80	-
201612	2016	12	26	5.82	1	38.37	26	(32.55)	38.37	-
201612	2016	12	27	22.19	8	39.75	27	(17.56)	39.75	-
201612	2016	12	28	20.95	7	41.55	28	(20.60)	41.55	-
201612	2016	12	29	14.42	3	44.90	29	(30.48)	44.90	-
201612	2016	12	30	23.90	10	49.02	30	(25.12)	49.02	-
201612	2016	12	31	19.60	6	56.30	31	(36.70)	56.30	-
				Sum = 1441.65		Sum = 1441.65		0.00	1441.65	0.00

CYCLE	NOV 2016		DEC 2016	Company Method	Staff Method
1	1-Nov	30	1-Dec	-	-
2	2-Nov	30	2-Dec	60.40	-
3	3-Nov	32	5-Dec	134.66	-
4	4-Nov	32	6-Dec	168.59	-
5	7-Nov	30	7-Dec	226.57	-
6	8-Nov	30	8-Dec	256.62	-
7	9-Nov	30	9-Dec	286.40	-
8	10-Nov	32	12-Dec	310.60	-
9	11-Nov	32	13-Dec	320.60	-
10	15-Nov	30	15-Dec	353.09	-
11	16-Nov	30	16-Dec	371.22	-
12	17-Nov	32	19-Dec	421.33	-
13	18-Nov	32	20-Dec	453.29	-
14	21-Nov	30	21-Dec	419.30	-
15	22-Nov	30	22-Dec	393.27	-
16	23-Nov	34	27-Dec	282.38	-
17	28-Nov	30	28-Dec	178.70	-
18	29-Nov	30	29-Dec	140.08	-
			Sum =	4,777.09	-

* Using the rank method discussed in Staff's testimony and the tariff, the above sum would be zero.

		Month	Day	NORM_WX	2016 Rank	Hypothetical Actual HDD	Rank	Hypothetical HDD ADD Company Method	Staff Re-ranked Normal	Hypothetical HDD ADD Staff Method
201610	2016	10	1	2.69	12	2.69	12	-	2.69	-
201610	2016	10	2	3.74	13	3.74	13	-	3.74	-
201610	2016	10	3	1.63	10	1.60	10	-	1.60	-
201610	2016	10	4	0.00	1	-	1	-	-	-
201610	2016	10	5	0.00	1	-	1	-	-	-
201610	2016	10	6	0.00	1	-	1	-	-	-
201610	2016	10	7	11.33	22	11.33	22	-	11.33	-
201610	2016	10	8	13.11	24	13.11	24	-	13.11	-
201610	2016	10	9	7.92	18	7.92	18	-	7.92	-
201610	2016	10	10	7.09	17	7.09	17	-	7.09	-
201610	2016	10	11	0.15	9	0.15	9	-	0.15	-
201610	2016	10	12	6.26	16	6.26	16	-	6.26	-
201610	2016	10	13	20.51	30	20.51	30	-	20.51	-
201610	2016	10	14	12.28	23	12.28	23	-	12.28	-
201610	2016	10	15	0.00	1	-	1	-	-	-
201610	2016	10	16	0.00	1	-	1	-	-	-
201610	2016	10	17	0.00	1	-	1	-	-	-
201610	2016	10	18	0.00	1	-	1	-	-	-
201610	2016	10	19	1.77	19	8.77	19	-	8.77	-
201610	2016	10	20	16.22	27	16.22	27	-	16.22	-
201610	2016	10	21	24.10	31	24.10	31	-	24.10	-
201610	2016	10	22	18.52	29	18.52	29	-	18.52	-
201610	2016	10	23	1.78	11	1.78	11	-	1.78	-
201610	2016	10	24	15.11	26	15.11	26	-	15.11	-
201610	2016	10	25	14.13	25	14.13	25	-	14.13	-
201610	2016	10	26	10.36	21	10.36	21	-	10.36	-
201610	2016	10	27	17.17	28	17.17	28	-	17.17	-
201610	2016	10	28	5.46	15	5.46	15	-	5.46	-
201610	2016	10	29	0.00	1	-	1	-	-	-
201610	2016	10	30	4.68	14	4.68	14	-	4.68	-
201610	2016	10	31	9.50	20	9.50	20	-	9.50	-
201611	2016	11	1	0.42	2	39.58	30	38.76	39.58	-
201611	2016	11	2	0.00	1	34.21	29	34.21	34.21	-
201611	2016	11	3	5.24	3	31.24	28	26.41	31.24	-
201611	2016	11	4	4.24	6	30.21	27	21.97	30.21	-
201611	2016	11	5	14.00	11	28.82	26	14.82	28.82	-
201611	2016	11	6	15.74	13	27.51	25	11.77	27.51	-
201611	2016	11	7	7.01	5	26.25	24	19.24	26.25	-
201611	2016	11	8	11.60	9	25.29	23	13.61	25.29	-
201611	2016	11	9	33.25	37	24.30	22	5.06	24.30	-
201611	2016	11	10	18.51	16	23.37	21	4.86	23.37	-
201611	2016	11	11	14.96	12	22.25	20	7.29	22.25	-
201611	2016	11	12	23.37	21	21.16	19	(7.22)	21.16	-
201611	2016	11	13	22.25	20	20.15	18	(2.11)	20.15	-
201611	2016	11	14	12.48	14	19.25	17	6.40	19.25	-
201611	2016	11	15	17.42	15	18.51	16	0.69	18.51	-
201611	2016	11	16	9.57	7	17.82	15	8.25	17.82	-
201611	2016	11	17	3.13	3	16.76	14	13.63	16.76	-
201611	2016	11	18	10.86	8	15.74	13	4.83	15.74	-
201611	2016	11	19	30.21	27	14.96	12	(15.25)	14.96	-
201611	2016	11	20	33.58	30	14.00	11	(25.58)	14.00	-
201611	2016	11	21	34.21	29	12.86	10	(21.35)	12.86	-
201611	2016	11	22	25.29	23	11.68	9	(13.61)	11.68	-
201611	2016	11	23	25.15	18	10.86	8	(9.26)	10.86	-
201611	2016	11	24	28.82	26	9.57	7	(13.25)	9.57	-
201611	2016	11	25	27.51	25	8.24	6	(19.27)	8.24	-
201611	2016	11	26	26.25	24	7.01	5	(19.24)	7.01	-
201611	2016	11	27	24.30	22	5.24	4	(19.07)	5.24	-
201611	2016	11	28	21.16	19	3.33	3	(18.02)	3.33	-
201611	2016	11	29	16.76	14	0.82	2	(15.55)	0.82	-
201611	2016	11	30	31.84	28	-	1	(31.84)	-	-
201612	2016	12	1	27.46	15	27.46	15	-	27.46	-
201612	2016	12	2	26.82	14	26.82	14	-	26.82	-
201612	2016	12	3	29.80	18	29.80	18	-	29.80	-
201612	2016	12	4	26.23	13	26.23	13	-	26.23	-
201612	2016	12	5	25.55	12	25.55	12	-	25.55	-
201612	2016	12	6	29.02	17	29.02	17	-	29.02	-
201612	2016	12	7	31.75	20	31.75	20	-	31.75	-
201612	2016	12	8	38.37	26	38.37	26	-	38.37	-
201612	2016	12	9	39.75	27	39.75	27	-	39.75	-
201612	2016	12	10	32.82	21	32.82	21	-	32.82	-
201612	2016	12	11	18.23	5	18.23	5	-	18.23	-
201612	2016	12	12	30.69	19	30.69	19	-	30.69	-
201612	2016	12	13	34.62	23	34.62	23	-	34.62	-
201612	2016	12	14	41.55	28	41.55	28	-	41.55	-
201612	2016	12	15	44.90	29	44.90	29	-	44.90	-
201612	2016	12	16	35.80	25	35.80	25	-	35.80	-
201612	2016	12	17	35.72	24	35.72	24	-	35.72	-
201612	2016	12	18	56.30	31	56.30	31	-	56.30	-
201612	2016	12	19	49.02	30	49.02	30	-	49.02	-
201612	2016	12	20	33.72	22	33.72	22	-	33.72	-
201612	2016	12	21	28.15	16	28.15	16	-	28.15	-
201612	2016	12	22	22.89	9	22.89	9	-	22.89	-
201612	2016	12	23	24.85	11	24.85	11	-	24.85	-
201612	2016	12	24	16.51	4	16.51	4	-	16.51	-
201612	2016	12	25	11.87	2	11.87	2	-	11.87	-
201612	2016	12	26	5.82	1	5.82	1	-	5.82	-
201612	2016	12	27	22.19	8	22.19	8	-	22.19	-
201612	2016	12	28	20.55	7	20.55	7	-	20.55	-
201612	2016	12	29	14.42	3	14.42	3	-	14.42	-
201612	2016	12	30	23.93	10	23.93	10	-	23.93	-
201612	2016	12	31	19.60	6	19.60	6	-	19.60	-
								(0.00)		-

OCT 2016		NOV 2016		DEC 2016	Company Method	Staff Method
					Nov Cycle	Dec Cycle
3-Oct	29	1-Nov	30	1-Dec	-	-
4-Oct	29	2-Nov	30	2-Dec	38.76	(38.76)
5-Oct	29	3-Nov	31	5-Dec	72.98	(72.98)
6-Oct	29	4-Nov	31	6-Dec	99.58	(99.58)
7-Oct	31	7-Nov	30	7-Dec	143.15	(143.15)
10-Oct	29	8-Nov	30	8-Dec	167.39	(167.39)
13-Oct	28	9-Nov	30	9-Dec	181.00	(181.00)
15-Oct	28	10-Nov	31	12-Dec	186.05	(186.05)
16-Oct	28	11-Nov	32	13-Dec	190.90	(190.90)
17-Oct	29	15-Nov	30	15-Dec	200.27	(200.27)
18-Oct	29	16-Nov	30	16-Dec	200.56	(200.56)
19-Oct	29	17-Nov	33	19-Dec	209.22	(209.22)
21-Oct	28	18-Nov	37	20-Dec	222.85	(222.85)
24-Oct	28	21-Nov	30	21-Dec	136.83	(136.83)
25-Oct	28	22-Nov	30	22-Dec	165.54	(165.54)
26-Oct	28	23-Nov	34	27-Dec	151.93	(151.93)
27-Oct	32	28-Nov	30	28-Dec	65.81	(65.81)
28-Oct	32	29-Nov	39	29-Dec	47.79	(47.79)
					2,536.05	(2,536.05)

				NORM_W	2016 Rank	Hypothetical Actual HDD	Rank	Hypothetical NDD-ADD, Company Method	Staff Reranked Normal	Hypothetical NDD-ADD, Staff Method	Difference Between Company and Staff
201611	2016	11	1	0.82	2	0.90	2	(0.08)	0.82	(0.08)	-
201611	2016	11	2	0.00	1	-	1	-	-	-	-
201611	2016	11	3	5.24	4	5.76	4	(0.52)	5.24	(0.52)	-
201611	2016	11	4	8.24	6	9.06	6	(0.82)	8.24	(0.82)	-
201611	2016	11	5	14.00	11	15.40	11	(1.40)	14.00	(1.40)	-
201611	2016	11	6	15.74	13	17.31	13	(1.57)	15.74	(1.57)	-
201611	2016	11	7	7.01	5	7.72	5	(0.70)	7.01	(0.70)	-
201611	2016	11	8	11.68	9	12.85	9	(1.17)	11.68	(1.17)	-
201611	2016	11	9	19.25	17	21.18	17	(1.93)	19.25	(1.93)	-
201611	2016	11	10	18.51	16	20.36	16	(1.85)	18.51	(1.85)	-
201611	2016	11	11	14.96	12	16.46	12	(1.50)	14.96	(1.50)	-
201611	2016	11	12	23.37	21	25.71	21	(2.34)	23.37	(2.34)	-
201611	2016	11	13	22.25	20	24.47	20	(2.22)	22.25	(2.22)	-
201611	2016	11	14	12.86	10	14.14	10	(1.29)	12.86	(1.29)	-
201611	2016	11	15	17.82	15	19.61	15	(1.78)	17.82	(1.78)	-
201611	2016	11	16	9.57	7	10.53	7	(0.96)	9.57	(0.96)	-
201611	2016	11	17	3.13	3	3.45	3	(0.31)	3.13	(0.31)	-
201611	2016	11	18	10.86	8	11.95	8	(1.09)	10.86	(1.09)	-
201611	2016	11	19	30.21	27	33.23	27	(3.02)	30.21	(3.02)	-
201611	2016	11	20	39.58	30	43.54	30	(3.96)	39.58	(3.96)	-
201611	2016	11	21	34.21	29	37.63	29	(3.42)	34.21	(3.42)	-
201611	2016	11	22	25.29	23	27.82	23	(2.53)	25.29	(2.53)	-
201611	2016	11	23	20.15	18	22.16	18	(2.01)	20.15	(2.01)	-
201611	2016	11	24	28.82	26	31.70	26	(2.88)	28.82	(2.88)	-
201611	2016	11	25	27.51	25	30.26	25	(2.75)	27.51	(2.75)	-
201611	2016	11	26	26.25	24	28.88	24	(2.63)	26.25	(2.63)	-
201611	2016	11	27	24.30	22	26.73	22	(2.43)	24.30	(2.43)	-
201611	2016	11	28	21.16	19	23.27	19	(2.12)	21.16	(2.12)	-
201611	2016	11	29	16.76	14	18.44	14	(1.68)	16.76	(1.68)	-
201611	2016	11	30	31.84	28	35.02	28	(3.18)	31.84	(3.18)	-
201612	2016	12	1	27.46	15	30.20	15	(2.75)	27.46	(2.75)	-
201612	2016	12	2	26.82	14	29.50	14	(2.68)	26.82	(2.68)	-
201612	2016	12	3	29.80	18	32.78	18	(2.98)	29.80	(2.98)	-
201612	2016	12	4	26.23	13	28.85	13	(2.62)	26.23	(2.62)	-
201612	2016	12	5	25.55	12	28.10	12	(2.55)	25.55	(2.55)	-
201612	2016	12	6	29.02	17	31.93	17	(2.90)	29.02	(2.90)	-
201612	2016	12	7	31.75	20	34.93	20	(3.18)	31.75	(3.18)	-
201612	2016	12	8	38.37	26	42.21	26	(3.84)	38.37	(3.84)	-
201612	2016	12	9	39.75	27	43.73	27	(3.98)	39.75	(3.98)	-
201612	2016	12	10	32.82	21	36.10	21	(3.28)	32.82	(3.28)	-
201612	2016	12	11	18.23	5	20.05	5	(1.82)	18.23	(1.82)	-
201612	2016	12	12	30.69	19	33.76	19	(3.07)	30.69	(3.07)	-
201612	2016	12	13	34.62	23	38.08	23	(3.46)	34.62	(3.46)	-
201612	2016	12	14	41.55	28	45.71	28	(4.16)	41.55	(4.16)	-
201612	2016	12	15	44.90	29	49.39	29	(4.49)	44.90	(4.49)	-
201612	2016	12	16	36.80	25	40.48	25	(3.68)	36.80	(3.68)	-
201612	2016	12	17	35.72	24	39.29	24	(3.57)	35.72	(3.57)	-
201612	2016	12	18	56.30	31	61.93	31	(5.63)	56.30	(5.63)	-
201612	2016	12	19	49.02	30	53.92	30	(4.90)	49.02	(4.90)	-
201612	2016	12	20	33.72	22	37.09	22	(3.37)	33.72	(3.37)	-
201612	2016	12	21	28.15	16	30.96	16	(2.81)	28.15	(2.81)	-
201612	2016	12	22	22.89	9	25.18	9	(2.29)	22.89	(2.29)	-
201612	2016	12	23	24.85	11	27.34	11	(2.49)	24.85	(2.49)	-
201612	2016	12	24	16.51	4	18.16	4	(1.65)	16.51	(1.65)	-
201612	2016	12	25	11.87	2	13.05	2	(1.19)	11.87	(1.19)	-
201612	2016	12	26	5.82	1	6.40	1	(0.58)	5.82	(0.58)	-
201612	2016	12	27	22.19	8	24.41	8	(2.22)	22.19	(2.22)	-
201612	2016	12	28	20.95	7	23.04	7	(2.09)	20.95	(2.09)	-
201612	2016	12	29	14.42	3	15.87	3	(1.44)	14.42	(1.44)	-
201612	2016	12	30	23.90	10	26.29	10	(2.39)	23.90	(2.39)	-
201612	2016	12	31	19.60	6	21.56	6	(1.96)	19.60	(1.96)	-
			Sum =	1441.65	Sum =	1585.82		-144.17	1441.65	-144.17	