## **BEFORE THE**

## WASHINGTON UTILITIES & TRANSPORTATION COMMISSION

UG-\_\_\_

## GENERAL RATE APPLICATION

OF

#### NORTHWEST NATURAL GAS COMPANY

December 31, 2018

Direct Exhibit of Dr. Bente Villadsen

**RATE OF RETURN ON EQUITY** 

**REDACTED VERSION** 

Exh. BV-4C

Exh. BV-4C Page 1 of 51

# **Exhibit BV-4: Cost of Capital Estimate Tables and Workpapers**

# Table No. BV-1

# **Table of Contents**

Table No. BV-1	Table of Contents
Table No. BV-2	Classification of Companies by Assets
Table No. BV-3	Market Value of the Gas Sample
Table No. BV-4	Capital Structure Summary
Table No. BV-5	Estimated Growth Rates
Table No. BV-6	DCF Cost of Equity of the Gas Sample
Table No. BV-7	Overall After-Tax DCF Cost of Capital of the Gas Sample
Table No. BV-8	DCF Cost of Equity at NW Natural's Deemed Capital Structure
Table No. BV-9	Risk Free Rate
Table No. BV-10	Risk Positioning Cost of Equity of the Gas Sample
Table No. BV-11	Overall After-Tax Cost of Capital of the Gas Sample
Table No. BV-12	Risk Positioning Cost of Equity at NW Natural's Deemed Capital Structure
Table No. BV-13	Hamada Procedure to Obtain Unlevered Asset Beta
Table No. BV-14	Sample Average Asset Beta Relevered at NW Natural's Deemed Capital Structure
Table No. BV-15	Risk-Positioning Cost of Equity using Hamada Procedure

Exh. BV-4C Page 3 of 51

# Table No. BV-2

# **Classification of Companies by Assets**

Company	<b>Regulated Assets</b>
Atmos Energy	R
Chesapeake Utilities	R
Northwest Nat. Gas	R
ONE Gas Inc.	R
Southwest Gas	R
NiSource	R
Spire Inc.	R
South Jersey Industries	М
New Jersey Resources	М

Sources and Notes:

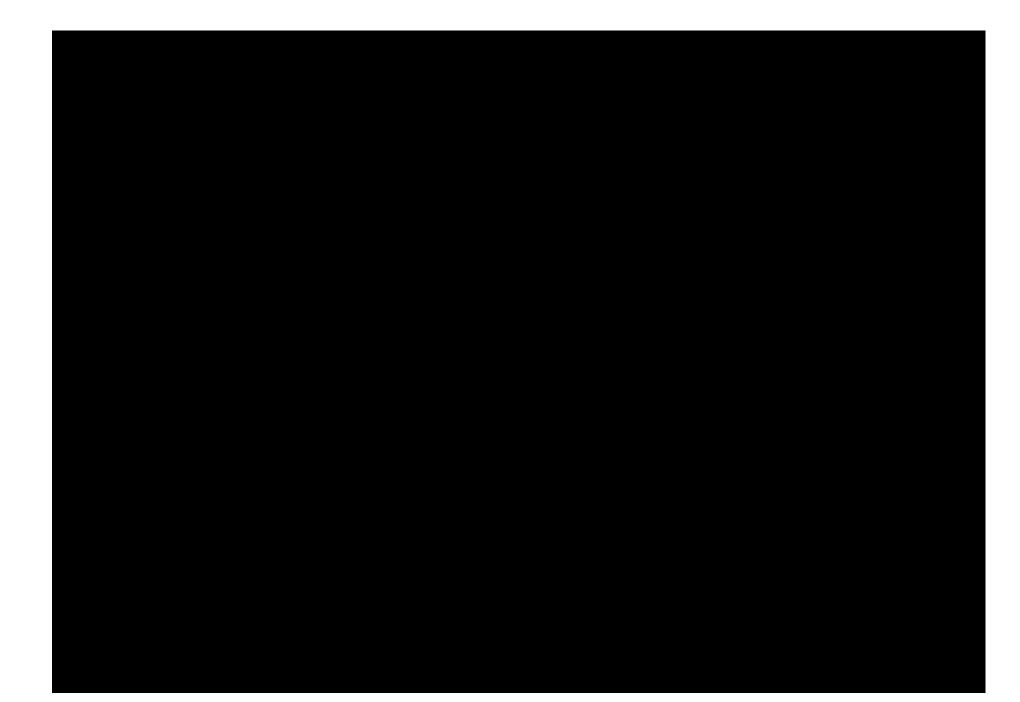
Calculations based on EEI definitions and Company 10K filings:

R = Regulated (greater than 80 percent of total assets are regulated).

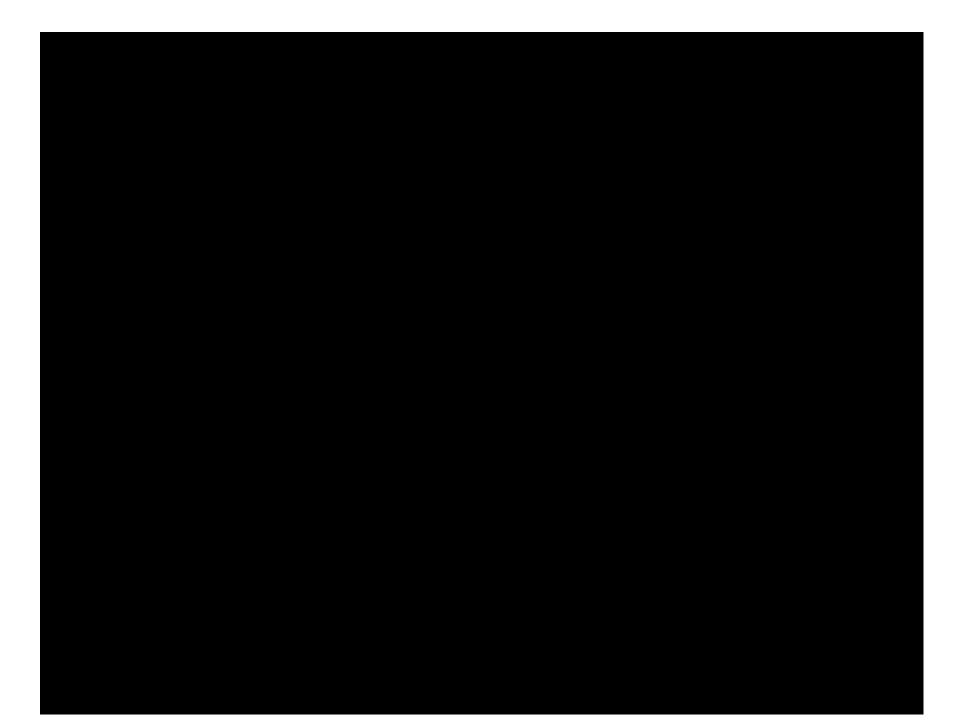
M = Mostly Regulated (50 to 80 percent of total assets are regulated).

D = Diversified (less than 50 percent of total assets are regulated).

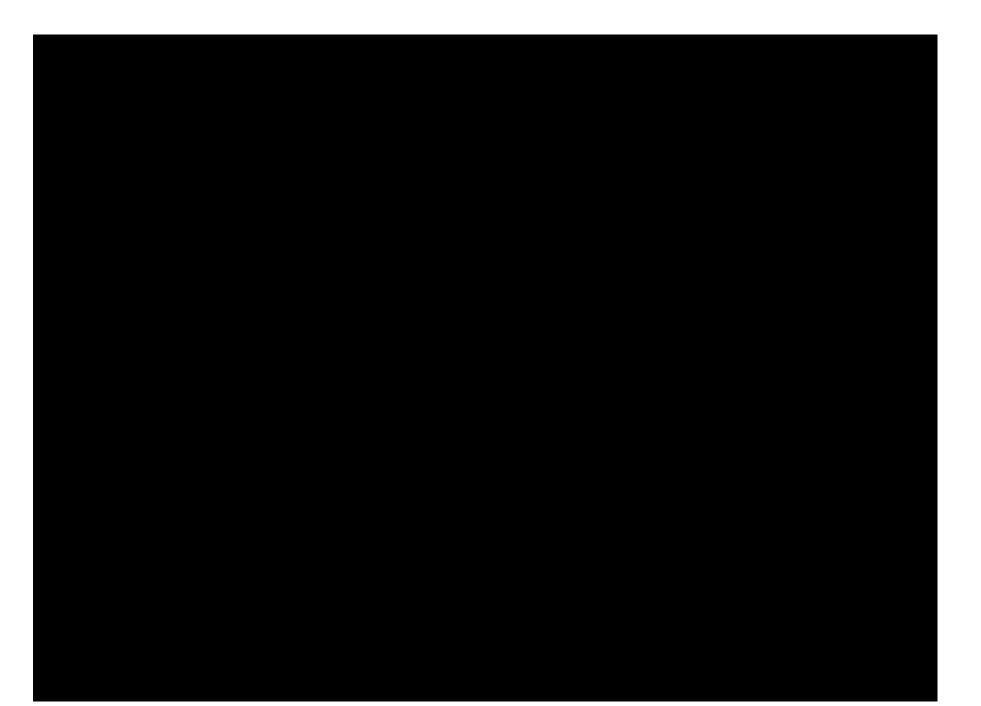
Exh. BV-4C Page 4 of 51



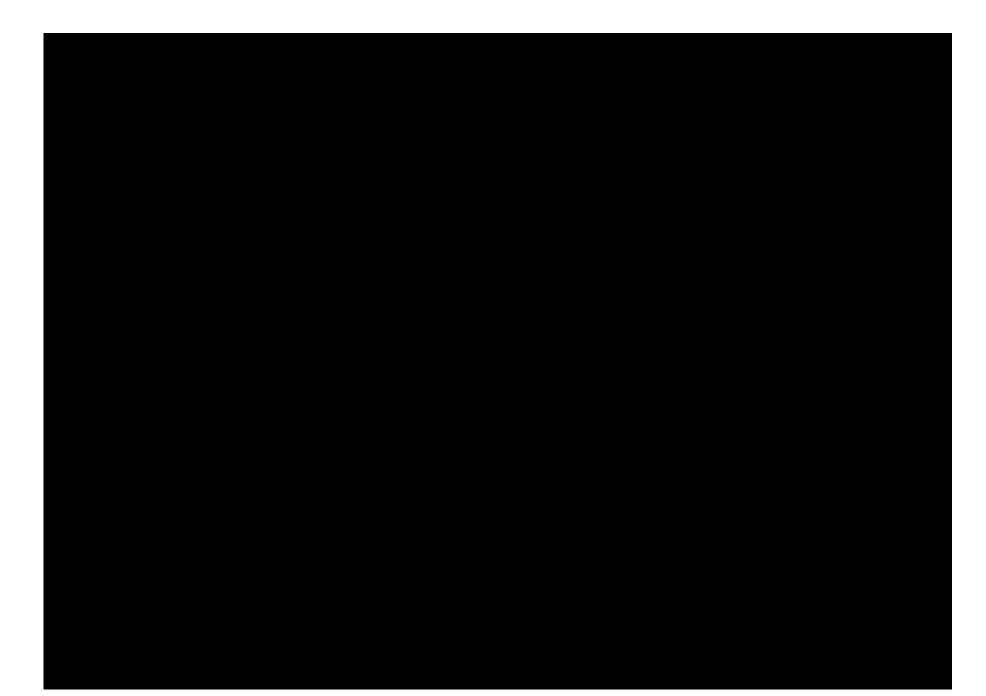
Exh. BV-4C Page 5 of 51



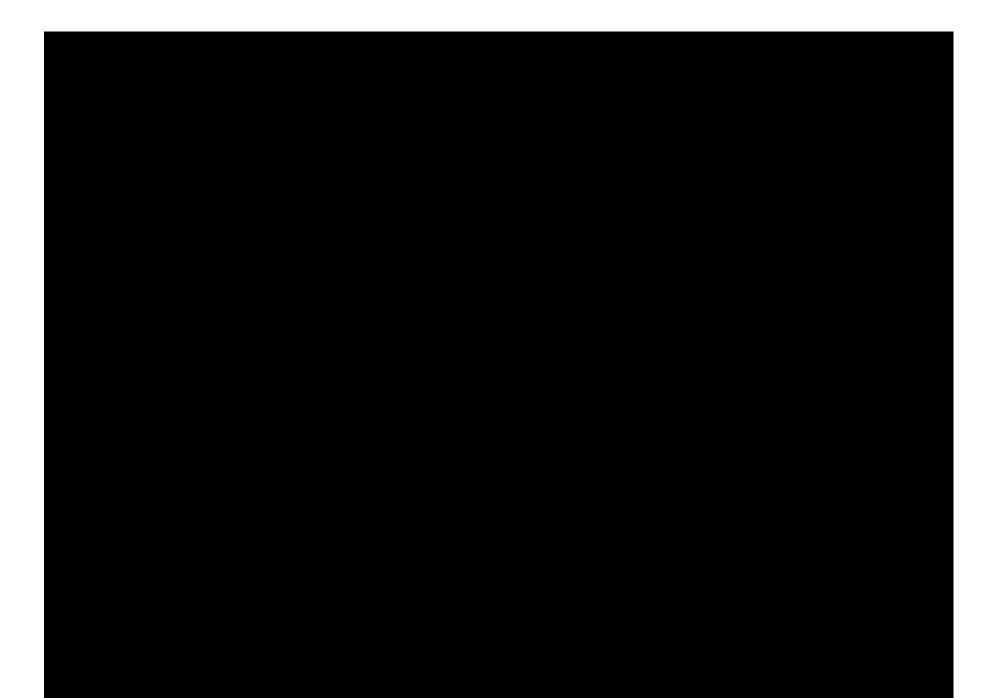
Exh. BV-4C Page 6 of 51



Exh. BV-4C Page 7 of 51



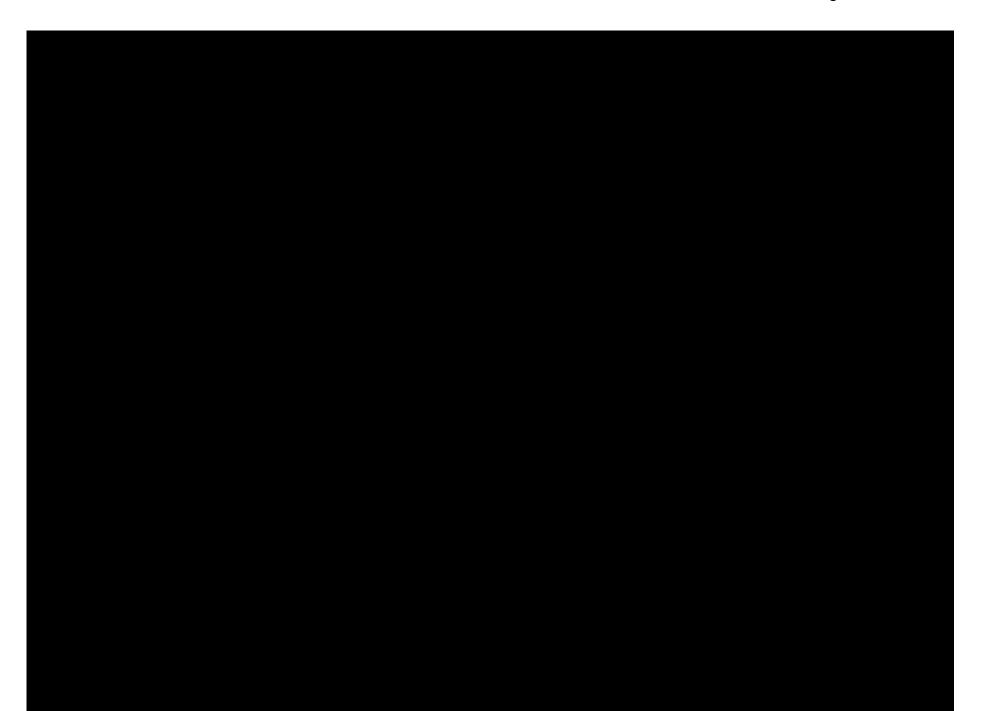
Exh. BV-4C Page 8 of 51



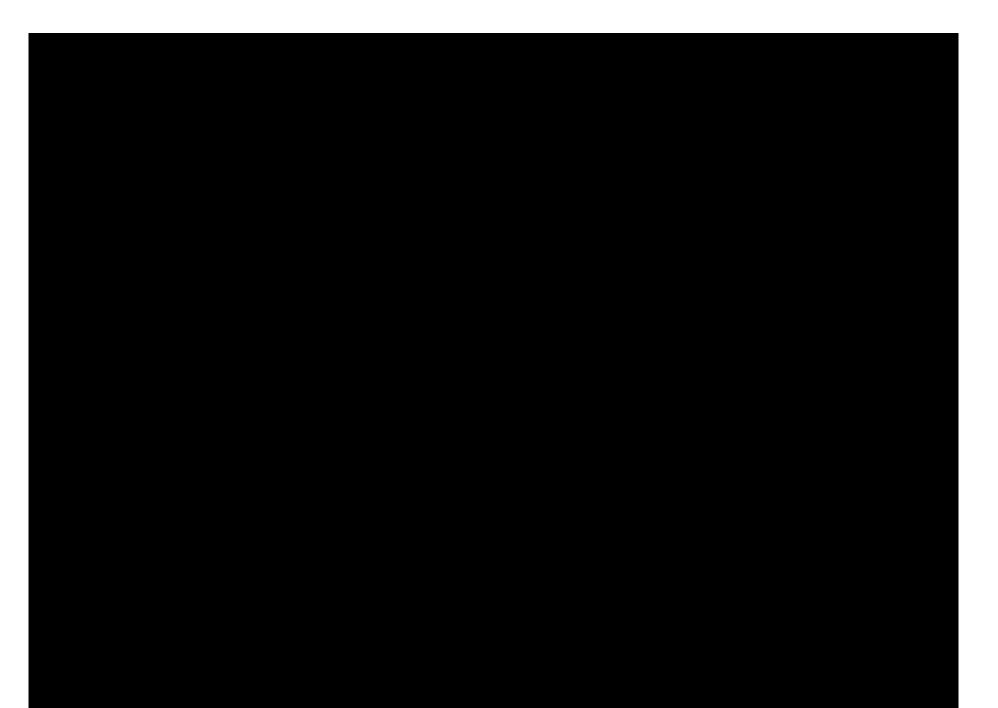
Exh. BV-4C Page 9 of 51



Exh. BV-4C Page 10 of 51



Exh. BV-4C Page 11 of 51



Exh. BV-4C Page 12 of 51



# Table No. BV-4

# **Capital Structure Summary**

	Γ	OCF Capital Structur	e	5-Year Average Capital Structure			
Company	Common Equity - Value Ratio [1]	Preferred Equity - Value Ratio [2]	Debt - Value Ratio [3]	Common Equity - Value Ratio [4]	Preferred Equity - Value Ratio [5]	Debt - Value Ratio [6]	
Atmos Energy	74.3%	0.0%	25.7%	65.7%	0.0%	34.3%	
Chesapeake Utilities	74.1%	0.0%	25.9%	73.0%	0.0%	27.0%	
Northwest Nat. Gas	69.1%	0.0%	30.9%	63.3%	0.0%	36.7%	
ONE Gas Inc.	75.4%	0.0%	24.6%	69.9%	0.0%	30.1%	
Southwest Gas	64.3%	0.0%	35.7%	63.0%	0.0%	37.0%	
NiSource	49.8%	2.1%	48.2%	42.3%	0.2%	57.5%	
Spire Inc.	61.5%	0.0%	38.5%	54.8%	0.0%	45.2%	
South Jersey Industries	51.7%	0.0%	48.3%	60.8%	0.0%	39.2%	
New Jersey Resources	76.3%	0.0%	23.7%	74.1%	0.0%	25.9%	
Average	66.3%	0.2%	33.5%	63.0%	0.0%	37.0%	

Sources and Notes:

[1], [4]: Supporting Schedule #1 to Table No. BV-4.

[2], [5]: Supporting Schedule #2 to Table No. BV-4.

[3], [6]: Supporting Schedule #3 to Table No. BV-4.

Values in this table may not add up exactly to 100% because of rounding.

Exh. BV-4C Page 14 of 51

5-Year

Average

[8]

65.7%

73.0%

63.3%

69.9%

63.0%

42.3%

54.8%

60.8%

74.1%

n/a

60.1%

28.4%

59.1%

65.4%

74.2%

#### **Calculation of the Average Common Equity - Market Value Ratio** DCF Capital 3rd Quarter, 3rd Quarter, 3rd Quarter, 3rd Quarter, 3rd Quarter, 3rd Quarter, Structure 2018 2017 2016 2015 2014 2013 [1] [2] [3] [4] [5] [6] [7] Atmos Energy 69.9% 74.3% 74.3% 69.2% 64.5% 60.7% 53.9% Chesapeake Utilities 74.1% 74.1% 76.1% 76.1% 70.8% 70.5% 69.0% Northwest Nat. Gas 69.1% 68.9% 69.1% 68.0% 59.7% 58.9% 53.4%

76.6%

65.6%

48.8%

58.8%

64.9%

74.7%

73.2%

65.9%

48.9%

54.0%

64.3%

72.1%

63.6%

60.7%

42.0%

50.9%

55.2%

73.6%

57.1%

60.7%

32.9%

49.9%

61.2%

74.9%

# Supporting Schedule #1 to Table No. BV-4

Sources and Notes:

South Jersey Industries

New Jersey Resources

Company

ONE Gas Inc.

Southwest Gas

NiSource

Spire Inc.

[1] - [7]: Table No. BV-3; Panels A - I, [v].

75.4%

64.3%

49.8%

61.5%

51.7%

76.3%

[8]: Average of [2] - [7] with 1/2 weighting to 3Q2018 and 3Q2013 for the purposes of calculating average capital structure during the period.

75.4%

64.3%

49.8%

61.5%

51.7%

76.3%

[1]: Reflects the current capital structure.

ONE Gas Inc. average reflects available data.

Exh. BV-4C Page 15 of 51

# Supporting Schedule #2 to Table No. BV-4

# **Calculation of the Average Preferred Equity - Market Value Ratio**

Company	DCF Capital Structure [1]	3rd Quarter, 2018 [2]	3rd Quarter, 2017 [3]	3rd Quarter, 2016 [4]	3rd Quarter, 2015 [5]	3rd Quarter, 2014 [6]	3rd Quarter, 2013 [7]	5-Year Average [8]
Atmos Energy	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chesapeake Utilities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Northwest Nat. Gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ONE Gas Inc.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	n/a	0.0%
Southwest Gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
NiSource	2.1%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Spire Inc.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
South Jersey Industries	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
New Jersey Resources	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Sources and Notes:

[1] - [7]: Table No. BV-3; Panels A - I, [w].

[8]: Average of [2] - [7] with 1/2 weighting to 3Q2018 and 3Q2013 for the purposes of calculating average capital structure during the period.

[1]: Reflects the current capital structure.

ONE Gas Inc. average reflects available data.

Exh. BV-4C Page 16 of 51

## Supporting Schedule #3 to Table No. BV-4

#### Calculation of the Average Debt - Market Value Ratio

Company	DCF Capital Structure [1]	3rd Quarter, 2018 [2]	3rd Quarter, 2017 [3]	3rd Quarter, 2016 [4]	3rd Quarter, 2015 [5]	3rd Quarter, 2014 [6]	3rd Quarter, 2013 [7]	5-Year Average [8]
Atmos Energy	25.7%	25.7%	30.1%	30.8%	35.5%	39.3%	46.1%	34.3%
Chesapeake Utilities	25.9%	25.9%	23.9%	23.9%	29.2%	29.5%	31.0%	27.0%
Northwest Nat. Gas	30.9%	30.9%	31.1%	32.0%	40.3%	41.1%	46.6%	36.7%
ONE Gas Inc.	24.6%	24.6%	23.4%	26.8%	36.4%	42.9%	n/a	30.1%
Southwest Gas	35.7%	35.7%	34.4%	34.1%	39.3%	39.3%	39.9%	37.0%
NiSource	48.2%	48.2%	51.2%	51.1%	58.0%	67.1%	71.6%	57.5%
Spire Inc.	38.5%	38.5%	41.2%	46.0%	49.1%	50.1%	40.9%	45.2%
South Jersey Industries	48.3%	48.3%	35.1%	35.7%	44.8%	38.8%	34.6%	39.2%
New Jersey Resources	23.7%	23.7%	25.3%	27.9%	26.4%	25.1%	25.8%	25.9%

Sources and Notes:

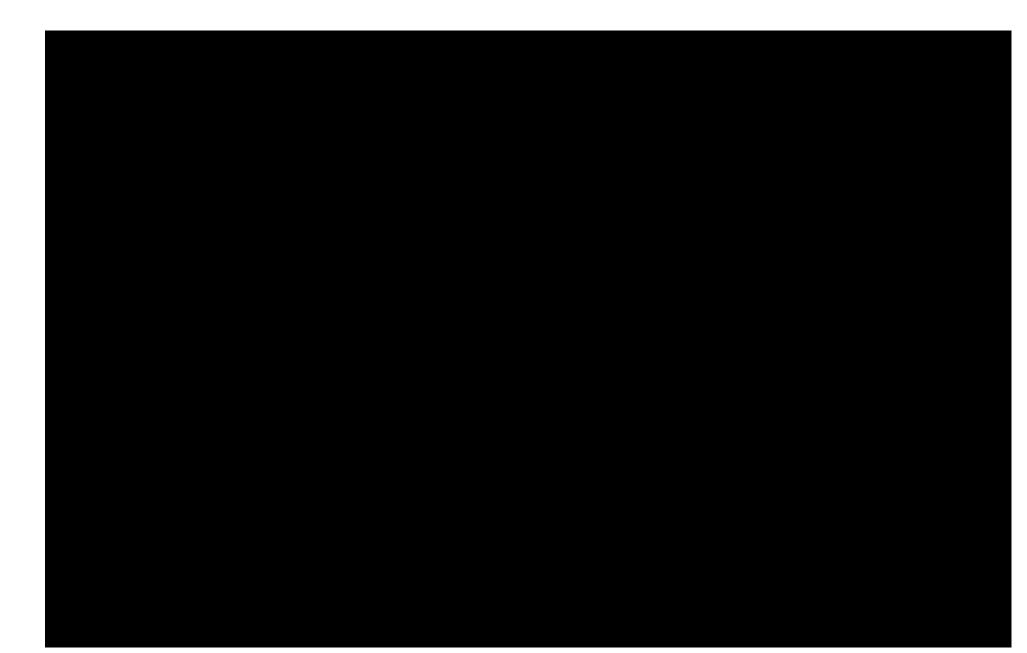
[1] - [7]: Table No. BV-3; Panels A - I, [x].

[8]: Average of [2] - [7] with 1/2 weighting to 3Q2018 and 3Q2013 for the purposes of calculating average capital structure during the period.

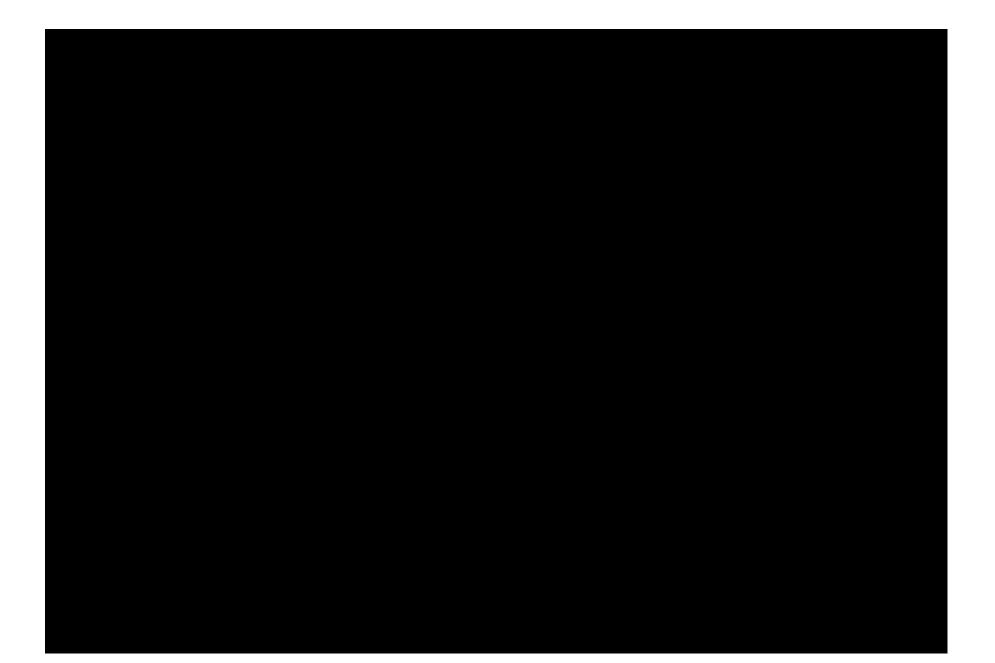
[1]: Reflects the current capital structure.

ONE Gas Inc. average reflects available data.

Exh. BV-4C Page 17 of 51



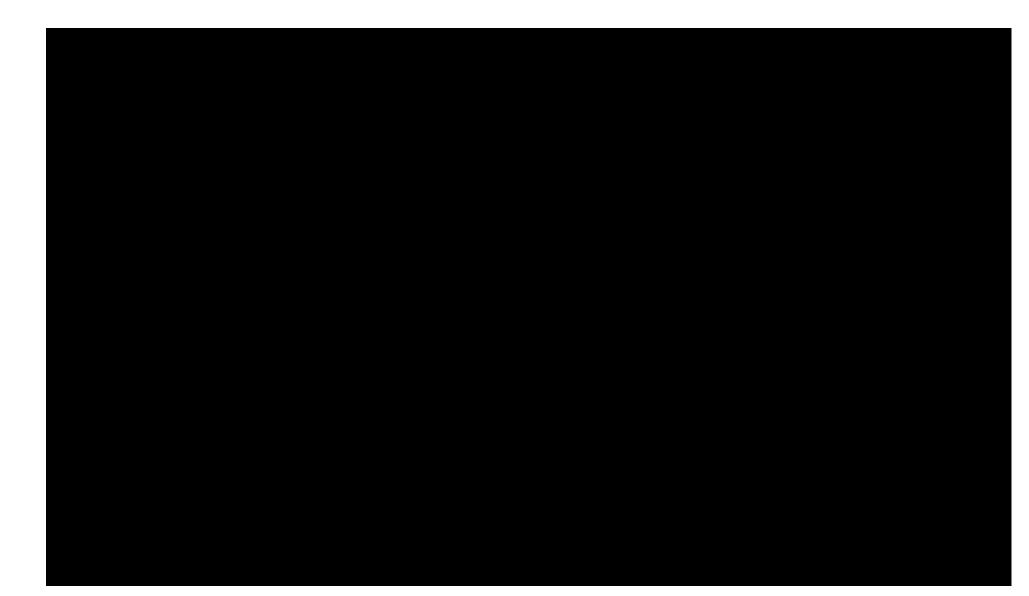
Exh. BV-4C Page 18 of 51



Exh. BV-4C Page 19 of 51



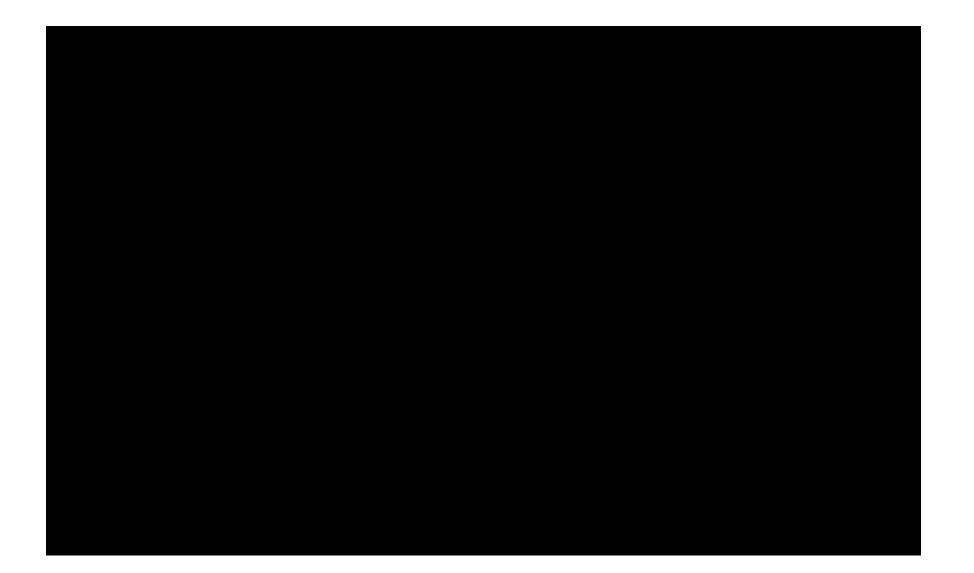
Exh. BV-4C Page 20 of 51



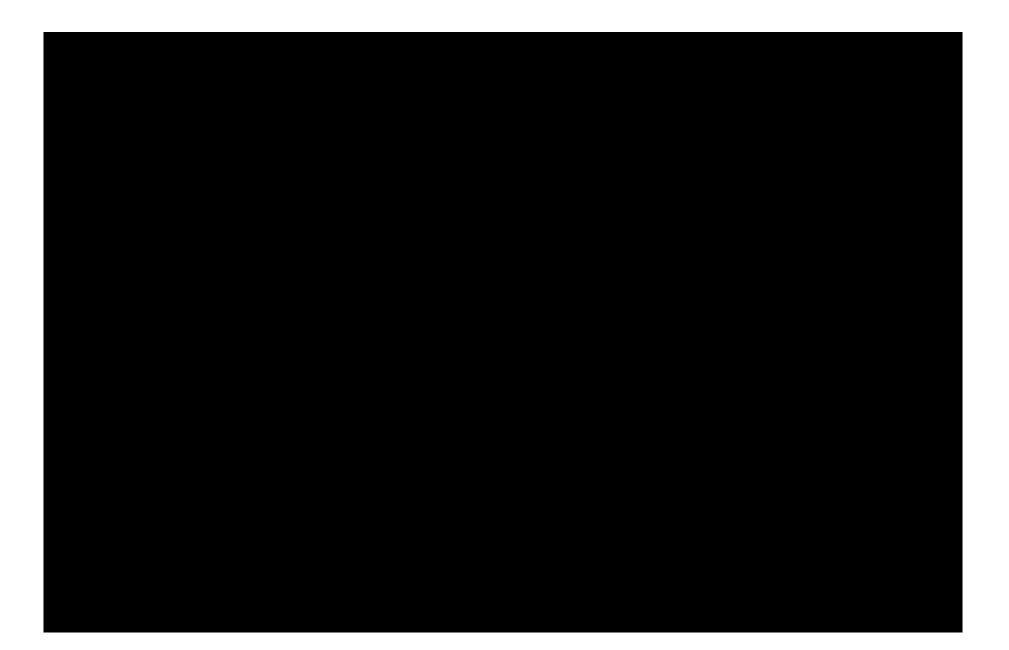
Exh. BV-4C Page 21 of 51



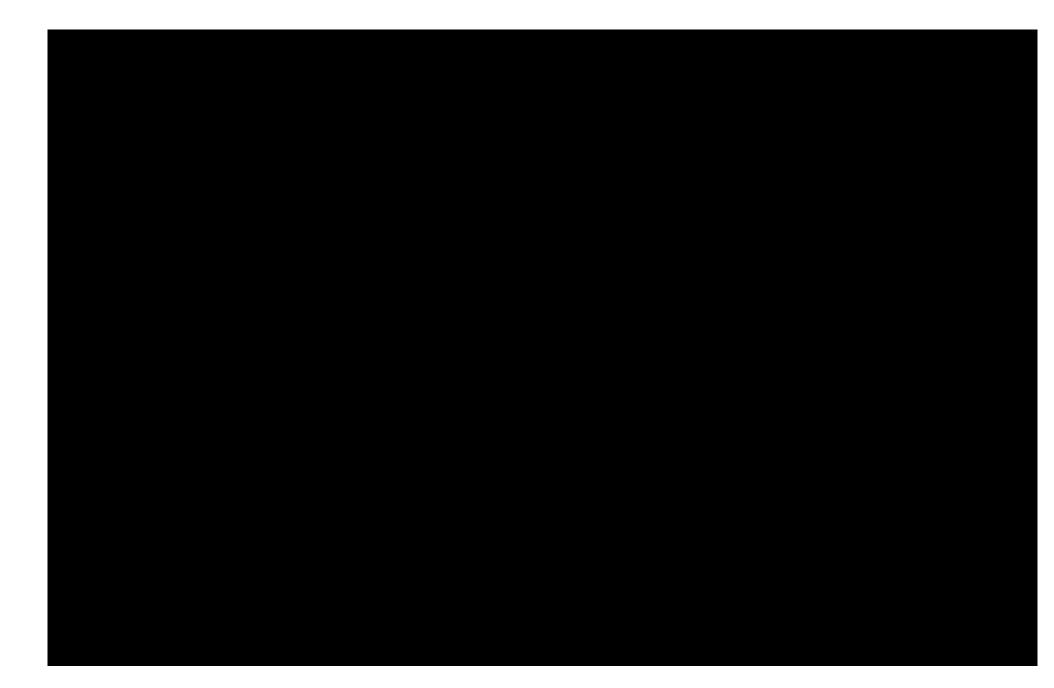
Exh. BV-4C Page 22 of 51



Exh. BV-4C Page 23 of 51



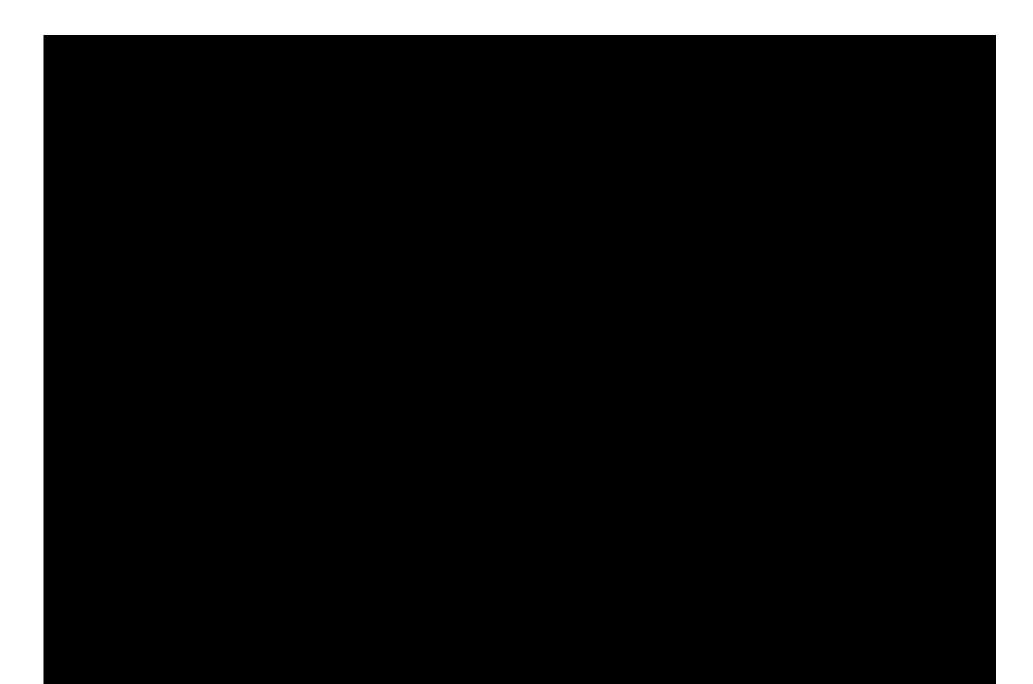
Exh. BV-4C Page 24 of 51



Exh. BV-4C Page 25 of 51



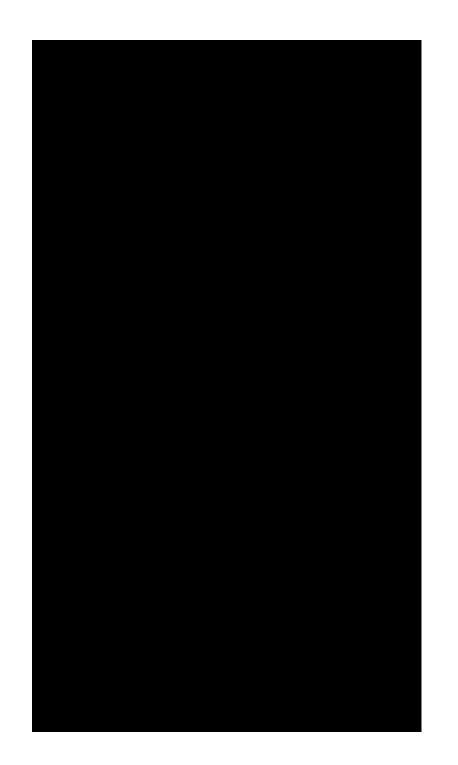
Exh. BV-4C Page 26 of 51



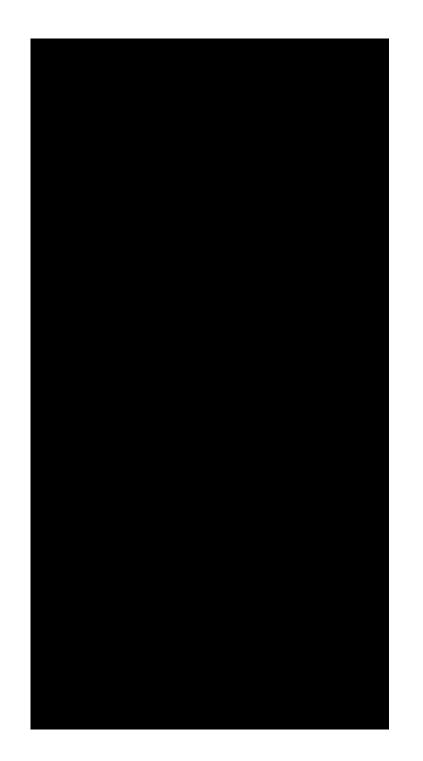
Exh. BV-4C Page 27 of 51



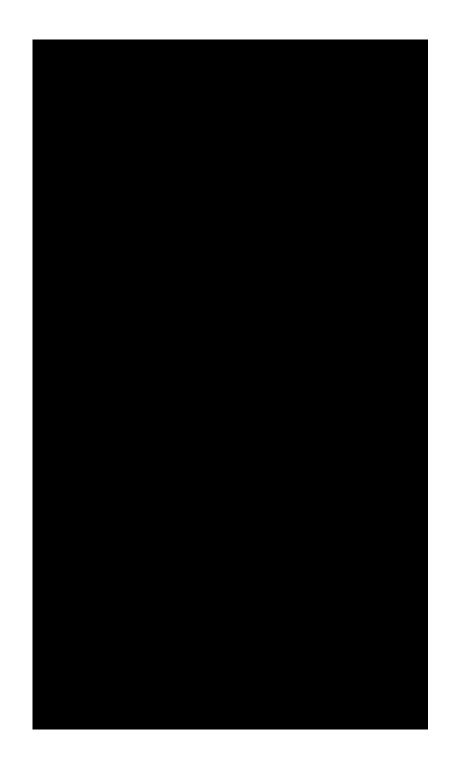
Exh. BV-4C Page 28 of 51



Exh. BV-4C Page 29 of 51



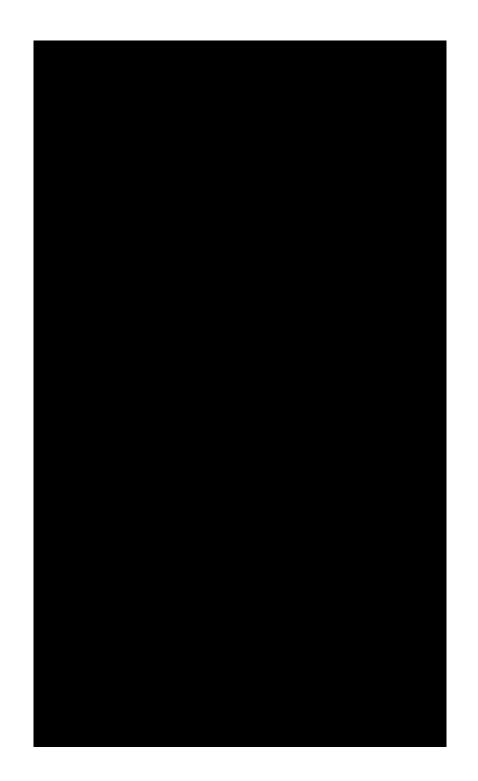
Exh. BV-4C Page 30 of 51



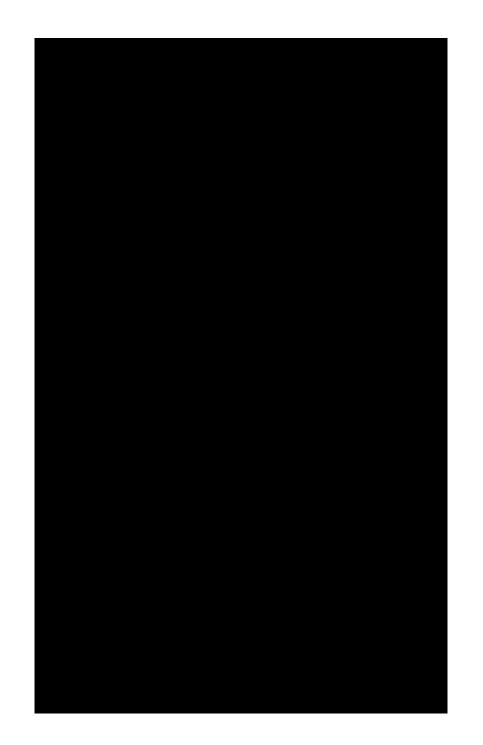
Exh. BV-4C Page 31 of 51



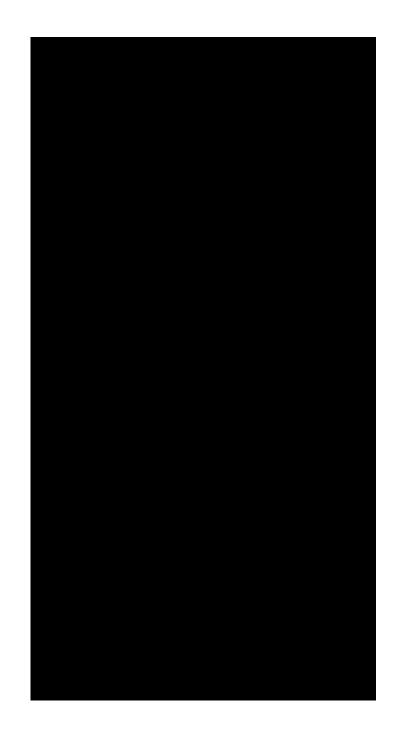
Exh. BV-4C Page 32 of 51



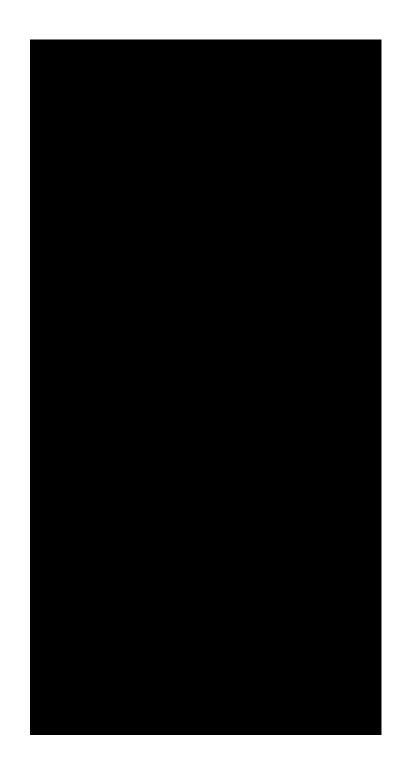
Exh. BV-4C Page 33 of 51



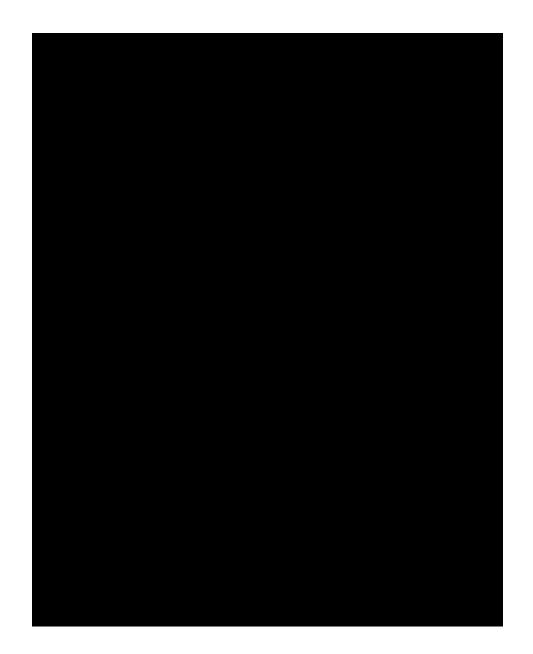
Exh. BV-4C Page 34 of 51



Exh. BV-4C Page 35 of 51



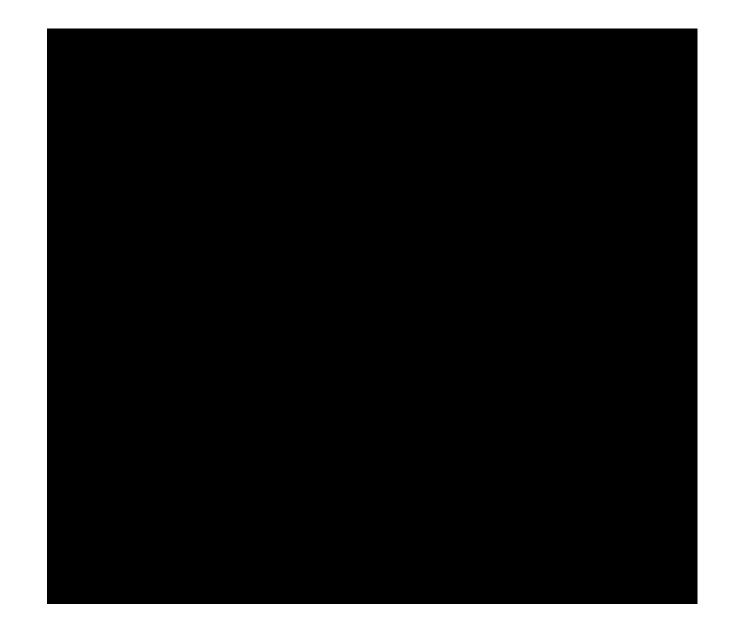
Exh. BV-4C Page 36 of 51



Exh. BV-4C Page 37 of 51



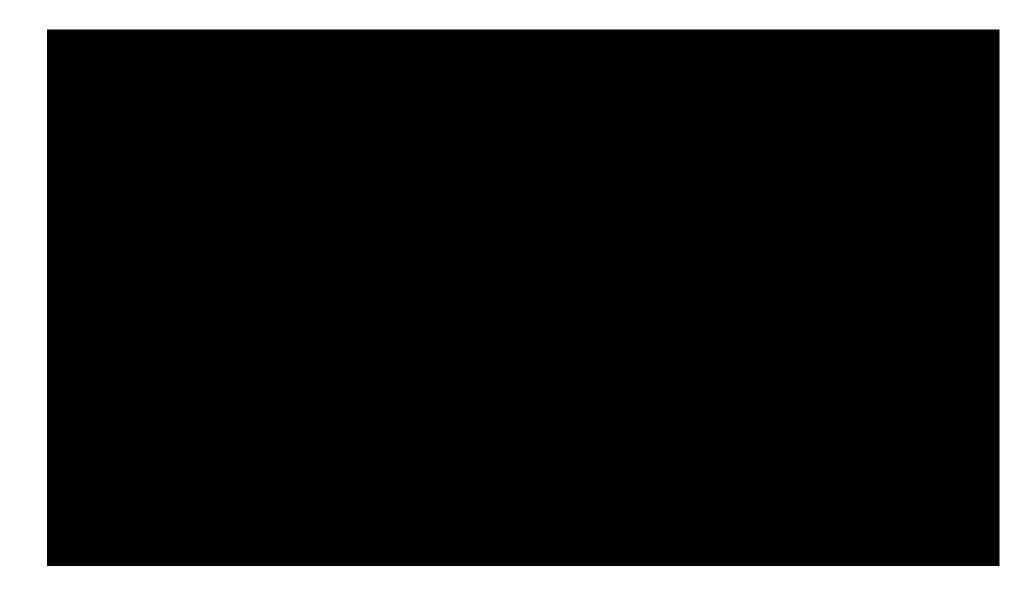
Exh. BV-4C Page 38 of 51



Exh. BV-4C Page 39 of 51



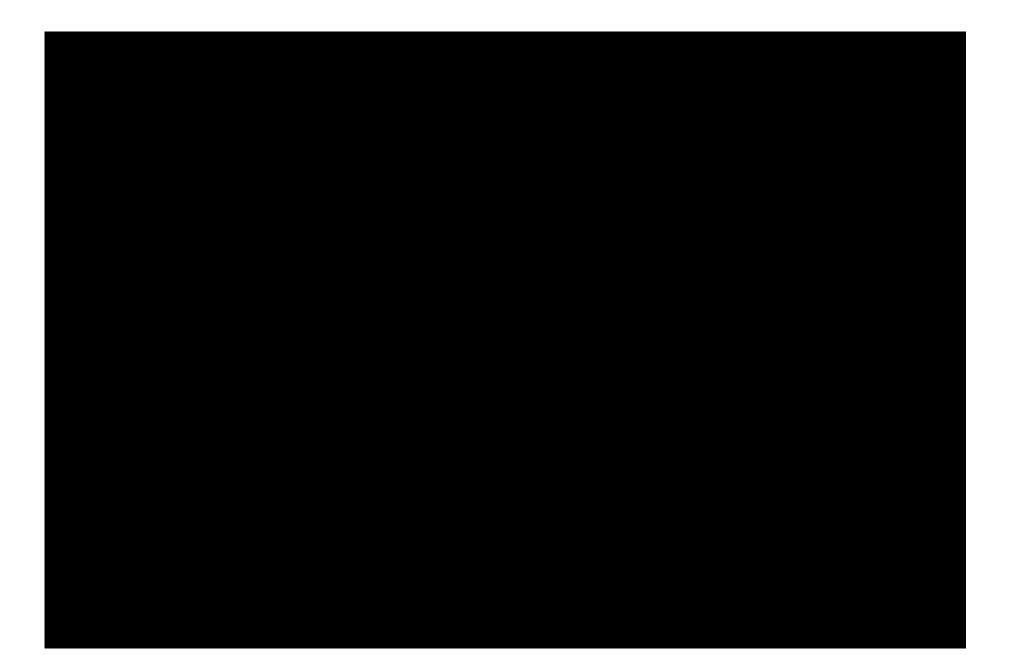
Exh. BV-4C Page 40 of 51



Exh. BV-4C Page 41 of 51



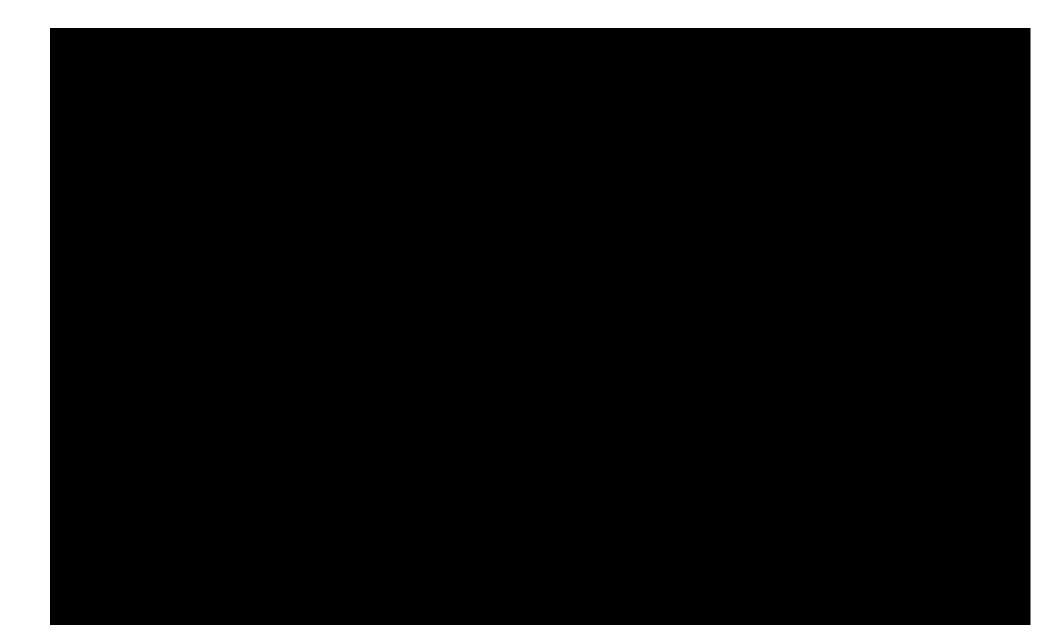
Exh. BV-4C Page 42 of 51



Exh. BV-4C Page 43 of 51



Exh. BV-4C Page 44 of 51



Exh. BV-4C Page 45 of 51



Exh. BV-4C Page 46 of 51



Exh. BV-4C Page 47 of 51



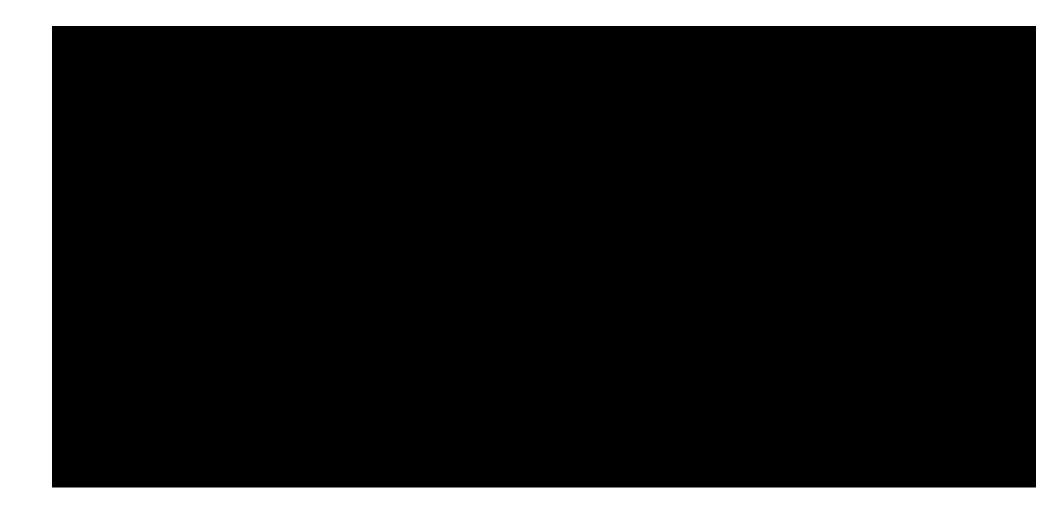
Exh. BV-4C Page 48 of 51



Exh. BV-4C Page 49 of 51



Exh. BV-4C Page 50 of 51



Exh. BV-4C Page 51 of 51

