

Application of SAN DIEGO GAS & ELECTRIC)
COMPANY for authority to update its gas and)
electric revenue requirement and base rates)
effective January 1, 2019 (U 902-M))

Application No. 17-10-007

Exhibit No.: (SDG&E-07-CWP-R)

REVISED CAPITAL WORKPAPERS TO
PREPARED DIRECT TESTIMONY
OF ELIZABETH A. MUSICH / MICHAEL A. BERMEL
ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

DECEMBER 2017



**2019 General Rate Case - REVISED
INDEX OF WORKPAPERS**

Exhibit SDG&E-07-CWP-R - GAS TRANSMISSION

DOCUMENT	PAGE
Overall Summary For Exhibit No. SDG&E-07-CWP-R	1
Category: A. NEW GAS TRANSMISSION PIPELINE	2
..004010 - GT PL NEW ADD-PRE 2004	3
..004110 - GT PIPELINE NEW ADD.-EXTERNALLY DRIVEN	11
Category: B. GAS TRANSMISSION REPLACEMENTS	20
..M04120 - MP PL REPLACE/EXTERNAL DRIVEN	21
Category: C. GAS TRANSMISSION RELOCATION	30
..004140 - GT PL RELOC-FRAN/PRV ROW/EXTERNAL DRIVEN	31
Category: D. GAS TRANSMISSION COMPRESSOR STATIONS	39
..M04150 - MP COMP STA ADD/RPL / EXTERNAL DRIVEN	40
..M04350 - MP COMP STA ADD/RPL /QUALITY-ECON DRIVEN	48
Category: E. GAS TRANSMISSION CATHODIC PROTECTION	59
..004160 - GT CATHODIC PROTECTION/EXTERNAL DRIVEN	60
Category: F. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS	69
..004180 - M&R STATIONS	70

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Overall Summary For Exhibit No. SDG&E-07-CWP-R

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich

In 2016 \$ (000)			
Adjusted-Forecast			
	2017	2018	2019
A. NEW GAS TRANSMISSION PIPELINE	3,901	3,901	3,901
B. GAS TRANSMISSION REPLACEMENTS	1,505	1,505	1,505
C. GAS TRANSMISSION RELOCATION	2	2	2
D. GAS TRANSMISSION COMPRESSOR STATIONS	4,415	4,115	3,965
E. GAS TRANSMISSION CATHODIC PROTECTION	184	184	184
F. GAS TRANSMISSION MEASUREMENT & REGULATION S¹	485	485	485
Total	10,492	10,192	10,042

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: A. NEW GAS TRANSMISSION PIPELINE
Workpaper: VARIOUS

Summary for Category: A. NEW GAS TRANSMISSION PIPELINE

	In 2016\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	39	39	39	39
Non-Labor	3,862	3,862	3,862	3,862
NSE	0	0	0	0
Total	3,901	3,901	3,901	3,901
FTE	0.4	0.4	0.4	0.4

004010 GT PL NEW ADD-PRE 2004

Labor	39	39	39	39
Non-Labor	3,862	3,862	3,862	3,862
NSE	0	0	0	0
Total	3,901	3,901	3,901	3,901
FTE	0.4	0.4	0.4	0.4

004110 GT PIPELINE NEW ADD.-EXTERNALLY DRIVEN

Labor	0	0	0	0
Non-Labor	0	0	0	0
NSE	0	0	0	0
Total	0	0	0	0
FTE	0.0	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
004010 - GT PL NEW ADD-PRE 2004

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00401.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004010 - GT PL NEW ADD-PRE 2004

Summary of Results (Constant 2016 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2012	2013	2014	2015	2016	2017	2018	2019
Years									
Labor	Base YR Rec	48	5	6	16	39	39	39	39
Non-Labor	Base YR Rec	99	64	59	5,982	3,862	3,862	3,862	3,862
NSE	Base YR Rec	0	0	0	0	0	0	0	0
Total		148	69	65	5,998	3,901	3,901	3,901	3,901
FTE	Base YR Rec	0.6	0.0	0.1	0.1	0.4	0.4	0.4	0.4

Business Purpose:

This Budget Code includes costs associated with the design and installation of new transmission pipelines to serve new customer loads and/or to improve the ability to move natural gas to points of critical need at adequate pressure.

Physical Description:

New pipeline projects include planning, design, permitting, material acquisition, construction, commissioning and impact mitigation for new pipelines and associated valves, fittings, pressure regulating stations and service lines. Projects can range in size and magnitude from a few feet to many miles of large diameter pipeline through urban, suburban, rural or remote terrain within SDG&E's service territory.

Project Justification:

New pipelines are extended to customers in accordance with tariff rules approved by the CPUC.

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00401.0
Category: A. NEW GAS TRANSMISSION PIPELINE
Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
Workpaper Group: 004010 - GT PL NEW ADD-PRE 2004

Forecast Methodology:

Labor - Base YR Rec

The labor portion of total direct project costs was forecasted using the base-year average capital cost forecasts methodology. This forecast methodology incorporates actual recorded capital costs from the current base year (2016). We could not reasonably employ a five-year average methodology for these new pipeline installations, because the recorded history varied considerably.

Non-Labor - Base YR Rec

Non-labor costs are typically for materials, construction equipment and contract labor. Such costs are estimated by experienced pipeline construction management personnel using reference to recent pipeline construction projects of similar scope, pipe size and construction environment.

NSE - Base YR Rec

None.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00401.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004010 - GT PL NEW ADD-PRE 2004

Summary of Adjustments to Forecast

In 2016 \$ (000)										
Forecast Method		Base Forecast			Forecast Adjustments			Adjusted-Forecast		
Years		2017	2018	2019	2017	2018	2019	2017	2018	2019
Labor	Base YR Rec	39	39	39	0	0	0	39	39	39
Non-Labor	Base YR Rec	3,861	3,861	3,861	1	1	1	3,862	3,862	3,862
NSE	Base YR Rec	0	0	0	0	0	0	0	0	0
Total		3,900	3,900	3,900	1	1	1	3,901	3,901	3,901
FTE	Base YR Rec	0.4	0.4	0.4	0.0	0.0	0.0	0.4	0.4	0.4

Forecast Adjustment Details

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
2017 Total		0	0	0	0	0.0	
2018 Total		0	0	0	0	0.0	
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00401.0
Category: A. NEW GAS TRANSMISSION PIPELINE
Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
Workpaper Group: 004010 - GT PL NEW ADD-PRE 2004

Determination of Adjusted-Recorded:

	2012 (\$000)	2013 (\$000)	2014 (\$000)	2015 (\$000)	2016 (\$000)
Recorded (Nominal \$)*					
Labor	43	4	5	14	34
Non-Labor	101	65	60	6,027	3,862
NSE	0	0	0	0	0
Total	144	69	66	6,041	3,895
FTE	0.5	0.0	0.1	0.1	0.3
Adjustments (Nominal \$)**					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal \$)					
Labor	43	4	5	14	34
Non-Labor	101	65	60	6,027	3,862
NSE	0	0	0	0	0
Total	144	69	66	6,041	3,895
FTE	0.5	0.0	0.1	0.1	0.3
Vacation & Sick (Nominal \$)					
Labor	6	1	1	2	6
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	6	1	1	2	6
FTE	0.1	0.0	0.0	0.0	0.1
Escalation to 2016\$					
Labor	-1	0	0	0	0
Non-Labor	-2	-1	-1	-45	0
NSE	0	0	0	0	0
Total	-2	-1	-1	-46	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016\$)					
Labor	48	5	6	16	39
Non-Labor	99	64	59	5,982	3,862
NSE	0	0	0	0	0
Total	148	69	65	5,998	3,901
FTE	0.6	0.0	0.1	0.1	0.4

* After company-wide exclusions of Non-GRC costs

** Refer to "Detail of Adjustments to Recorded" page for line item adjustments

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00401.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004010 - GT PL NEW ADD-PRE 2004

Summary of Adjustments to Recorded:

		In Nominal \$(000)				
Years	2012	2013	2014	2015	2016	
Labor	0	0	0	0	0	
Non-Labor	0	0	0	0	0	
NSE	0	0	0	0	0	
Total	0	0	0	0	0	
FTE	0.0	0.0	0.0	0.0	0.0	

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
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Note: Totals may include rounding differences.

**Beginning of Workpaper Sub Details for
Workpaper Group 004010**

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00401.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004010 - GT PL NEW ADD-PRE 2004
 Workpaper Detail: 004010.001 - GT PL

In-Service Date: Not Applicable

Description:

This budget code includes costs associated with the design and installation of new transmission pipelines to serve new customer loads and/or to improve the ability to move natural gas to points of critical need and adequate pressure.

Forecast In 2016 \$(000)				
	Years	2017	2018	2019
Labor		39	39	39
Non-Labor		3,862	3,862	3,862
NSE		0	0	0
	Total	3,901	3,901	3,901
FTE		0.4	0.4	0.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
004110 - GT PIPELINE NEW ADD.-EXTERNALLY DRIVEN

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00411.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004110 - GT PIPELINE NEW ADD.-EXTERNALLY DRIVEN

Summary of Results (Constant 2016 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2012	2013	2014	2015	2016	2017	2018	2019
Years									
Labor	Zero-Based	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	0	0	0	0	0	0	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	0	0	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

This Budget Code includes costs associated with the design and installation of new transmission pipelines to serve new customer loads and/or to improve the ability to move natural gas to points of critical need at adequate pressure.

Physical Description:

New pipeline projects include planning, design, permitting, material acquisition, construction, commissioning and impact mitigation for new pipelines and associated valves, fittings, pressure regulating stations and service lines. Projects can range in size and magnitude from a few feet to many miles of large diameter pipeline through urban, suburban, rural or remote terrain within SDG&E's service territory.

Project Justification:

New pipelines are extended to customers in accordance with tariff rules approved by the CPUC.

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00411.0
Category: A. NEW GAS TRANSMISSION PIPELINE
Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
Workpaper Group: 004110 - GT PIPELINE NEW ADD.-EXTERNALLY DRIVEN

Forecast Methodology:

Labor - Zero-Based

The labor portion of total direct project costs is derived of estimate prepared by personnel experienced in this type of work and with reference to recent projects of similar scope.

Non-Labor - Zero-Based

Non-labor costs are typically for materials, construction equipment and contract labor. The estimate was prepared by personnel experienced in this type of work and with reference to recent projects of similar scope.

NSE - Zero-Based

None. These are pipeline-related projects.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00411.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004110 - GT PIPELINE NEW ADD.-EXTERNALLY DRIVEN

Summary of Adjustments to Forecast

In 2016 \$ (000)										
Forecast Method		Base Forecast			Forecast Adjustments			Adjusted-Forecast		
Years		2017	2018	2019	2017	2018	2019	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	0	0	0	0	0	0	0	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	0	0	0	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Forecast Adjustment Details

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
2017 Total		0	0	0	0	0.0	
2018 Total		0	0	0	0	0.0	
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00411.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004110 - GT PIPELINE NEW ADD.-EXTERNALLY DRIVEN

Determination of Adjusted-Recorded:

	2012 (\$000)	2013 (\$000)	2014 (\$000)	2015 (\$000)	2016 (\$000)
Recorded (Nominal \$)*					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Adjustments (Nominal \$)**					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal \$)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal \$)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016\$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016\$)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs

** Refer to "Detail of Adjustments to Recorded" page for line item adjustments

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
 2019 GRC - REVISED
 Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00411.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004110 - GT PIPELINE NEW ADD.-EXTERNALLY DRIVEN

Summary of Adjustments to Recorded:

In Nominal \$(000)					
Years	2012	2013	2014	2015	2016
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
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Note: Totals may include rounding differences.

**Beginning of Workpaper Sub Details for
Workpaper Group 004110**

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00411.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004110 - GT Stor Comp Sta Add/Rpls / Externally Driven
 Workpaper Detail: 004110.001 - GT Pipeline New
 In-Service Date: 12/31/2017

Description:

This workpaper includes miscellaneous capital work in Gas Transmission.

Forecast In 2016 \$(000)				
	Years	<u>2017</u>	<u>2018</u>	<u>2019</u>
Labor		0	0	0
Non-Labor		0	0	0
NSE		0	0	0
	Total	0	0	0
FTE		0.0	0.0	0.0

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
 2019 GRC - REVISED
 Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00411.0
 Category: A. NEW GAS TRANSMISSION PIPELINE
 Category-Sub: 1. NEW GAS TRANSMISSION PIPELINE
 Workpaper Group: 004110 - GT Stor Comp Sta Add/Rpls / Externally Driven
 Workpaper Detail: 004110.002 - GT Pipeline New
 In-Service Date: 12/31/2017
 Description:

Forecast In 2016 \$(000)				
Years	2017	2018	2019	
Labor	0	0	0	
Non-Labor	0	0	0	
NSE	0	0	0	
Total	0	0	0	
FTE	0.0	0.0	0.0	

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Category: B. GAS TRANSMISSION REPLACEMENTS
 Workpaper: M04120

Summary for Category: B. GAS TRANSMISSION REPLACEMENTS

	In 2016\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	45	69	69	69
Non-Labor	1,643	1,436	1,436	1,436
NSE	0	0	0	0
Total	1,688	1,505	1,505	1,505
FTE	0.5	0.7	0.7	0.7

M04120 MP PL REPLACE/EXTERNAL DRIVEN

Labor	45	69	69	69
Non-Labor	1,643	1,436	1,436	1,436
NSE	0	0	0	0
Total	1,688	1,505	1,505	1,505
FTE	0.5	0.7	0.7	0.7

Note: Totals may include rounding differences.

Beginning of Workpaper Group
M04120 - MP PL REPLACE/EXTERNAL DRIVEN

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0412.0
 Category: B. GAS TRANSMISSION REPLACEMENTS
 Category-Sub: 1. GAS TRANSMISSION REPLACEMENTS
 Workpaper Group: M04120 - MP PL REPLACE/EXTERNAL DRIVEN

Summary of Results (Constant 2016 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2012	2013	2014	2015	2016	2017	2018	2019
Years									
Labor	5-YR Average	12	68	27	195	45	69	69	69
Non-Labor	5-YR Average	81	1,126	900	3,436	1,643	1,436	1,436	1,436
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		93	1,193	927	3,631	1,688	1,505	1,505	1,505
FTE	5-YR Average	0.1	0.7	0.3	2.1	0.5	0.7	0.7	0.7

Business Purpose:

Natural gas transmission pipelines need to be replaced due to the condition of the pipeline or hazardous conditions affecting the existing pipeline location. Some pipeline sections need to be replaced due to erosion from agricultural activities or storm water runoff. Replacements are also required due to class location changes in the vicinity of the transmission pipeline. Pipelines with a history of leakage, poor coating, or that are difficult to cathodically protect are routinely evaluated for possible replacement.

Physical Description:

Projects in this Budget Code include the cost to plan, design, permit, acquire materials, construct, commission, and mitigate impacts for the replacement of pipelines, fittings, valves, and associated pressure regulating stations and service lines. Multiple projects are completed each year ranging in size and magnitude from a few feet to several miles of replacement. Projects can involve difficult and hazardous access with many logistical challenges caused by weather or physical terrain. This forecast is for multiple smaller projects varying in scope and pipe size but not qualifying for separate work papers. Also included are projects to replace pipelines due to class location changes.

Project Justification:

Pipeline replacement projects are determined due to many factors including class location changes, exposure due to erosion, and pipeline corrosion.

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0412.0
Category: B. GAS TRANSMISSION REPLACEMENTS
Category-Sub: 1. GAS TRANSMISSION REPLACEMENTS
Workpaper Group: M04120 - MP PL REPLACE/EXTERNAL DRIVEN

Forecast Methodology:

Labor - 5-YR Average

Planned years are estimated at 5-yr averages. Labor is broken out according to the dollar ratio during the most recent five recorded years.

Non-Labor - 5-YR Average

Planned years are estimated at 5-yr averages. Non-Labor is broken out according to the dollar ratio during the most recent five recorded years.

NSE - 5-YR Average

None.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0412.0
 Category: B. GAS TRANSMISSION REPLACEMENTS
 Category-Sub: 1. GAS TRANSMISSION REPLACEMENTS
 Workpaper Group: M04120 - MP PL REPLACE/EXTERNAL DRIVEN

Summary of Adjustments to Forecast

In 2016 \$ (000)										
Forecast Method		Base Forecast			Forecast Adjustments			Adjusted-Forecast		
Years		2017	2018	2019	2017	2018	2019	2017	2018	2019
Labor	5-YR Average	69	69	69	0	0	0	69	69	69
Non-Labor	5-YR Average	1,437	1,437	1,437	-1	-1	-1	1,436	1,436	1,436
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		1,506	1,506	1,506	-1	-1	-1	1,505	1,505	1,505
FTE	5-YR Average	0.7	0.7	0.7	0.0	0.0	0.0	0.7	0.7	0.7

Forecast Adjustment Details

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
2017 Total		0	0	0	0	0.0	
2018 Total		0	0	0	0	0.0	
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0412.0
 Category: B. GAS TRANSMISSION REPLACEMENTS
 Category-Sub: 1. GAS TRANSMISSION REPLACEMENTS
 Workpaper Group: M04120 - MP PL REPLACE/EXTERNAL DRIVEN

Determination of Adjusted-Recorded:

	2012 (\$000)	2013 (\$000)	2014 (\$000)	2015 (\$000)	2016 (\$000)
Recorded (Nominal \$)*					
Labor	11	59	24	170	38
Non-Labor	82	1,138	920	3,462	1,643
NSE	0	0	0	0	0
Total	93	1,197	944	3,632	1,682
FTE	0.1	0.6	0.3	1.8	0.4
Adjustments (Nominal \$)**					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal \$)					
Labor	11	59	24	170	38
Non-Labor	82	1,138	920	3,462	1,643
NSE	0	0	0	0	0
Total	93	1,197	944	3,632	1,682
FTE	0.1	0.6	0.3	1.8	0.4
Vacation & Sick (Nominal \$)					
Labor	2	9	4	26	6
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	2	9	4	26	6
FTE	0.0	0.1	0.0	0.3	0.1
Escalation to 2016\$					
Labor	0	-1	-1	-1	0
Non-Labor	-1	-12	-20	-26	0
NSE	0	0	0	0	0
Total	-2	-13	-20	-28	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016\$)					
Labor	12	68	27	195	45
Non-Labor	81	1,126	900	3,436	1,643
NSE	0	0	0	0	0
Total	93	1,193	927	3,631	1,688
FTE	0.1	0.7	0.3	2.1	0.5

* After company-wide exclusions of Non-GRC costs

** Refer to "Detail of Adjustments to Recorded" page for line item adjustments

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
 2019 GRC - REVISED
 Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0412.0
 Category: B. GAS TRANSMISSION REPLACEMENTS
 Category-Sub: 1. GAS TRANSMISSION REPLACEMENTS
 Workpaper Group: M04120 - MP PL REPLACE/EXTERNAL DRIVEN

Summary of Adjustments to Recorded:

		In Nominal \$(000)				
Years		2012	2013	2014	2015	2016
	Labor	0	0	0	0	0
	Non-Labor	0	0	0	0	0
	NSE	0	0	0	0	0
	Total	0	0	0	0	0
	FTE	0.0	0.0	0.0	0.0	0.0

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
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Note: Totals may include rounding differences.

**Beginning of Workpaper Sub Details for
Workpaper Group M04120**

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0412.0
 Category: B. GAS TRANSMISSION REPLACEMENTS
 Category-Sub: 1. GAS TRANSMISSION REPLACEMENTS
 Workpaper Group: M04120 - MP PL REPLACE/EXTERNAL DRIVEN
 Workpaper Detail: M04120.001 - RAMP - Base Blanket WOA
 In-Service Date: Not Applicable

Description:

Blanket work order for costs associated with the design and installation of transmission pipeline replacements. Transmission pipelines are replaced due to either condition of the existing pipeline or hazardous condition affecting the existing pipeline location. Replacements are also required due to class location changes in the vicinity of the transmission pipeline.

Forecast In 2016 \$(000)				
	Years	2017	2018	2019
Labor		69	69	69
Non-Labor		1,436	1,436	1,436
NSE		0	0	0
	Total	1,505	1,505	1,505
FTE		0.7	0.7	0.7

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0412.0
 Category: B. GAS TRANSMISSION REPLACEMENTS
 Category-Sub: 1. GAS TRANSMISSION REPLACEMENTS
 Workpaper Group: M04120 - MP PL REPLACE/EXTERNAL DRIVEN
 Workpaper Detail: M04120.001 - RAMP - Base Blanket WOA

RAMP Item # 1

RAMP Chapter: SDG&E-10

Program Name: HCA Class Location Followup Mitigation

Program Description: HCAs for natural gas pipeline focus on populated areas which affects class location. HCA identification relies on pipeline-specific information regarding the location, size, and operating characteristics of the line, as well as the identification of structures, specified sites, and their intended usage along the pipeline right-of-way

Risk/Mitigation:

Risk: Asset Failure

Mitigation: Gas Transmission Operations

Forecast CPUC Cost Estimates (\$000)

	<u>2017</u>	<u>2018</u>	<u>2019</u>
Low	1,505	1,505	1,505
High	1,505	1,505	1,505

Funding Source: CPUC-GRC

Forecast Method: Base Year

Work Type: Non-Mandated

Work Type Citation: TBD

Historical Embedded Cost Estimates (\$000)

Embedded Costs: 1505

Explanation:

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: C. GAS TRANSMISSION RELOCATION
Workpaper: 004140

Summary for Category: C. GAS TRANSMISSION RELOCATION

	In 2016\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	0	0	0	0
Non-Labor	0	2	2	2
NSE	0	0	0	0
Total	<u>0</u>	<u>2</u>	<u>2</u>	<u>2</u>
FTE	0.0	0.0	0.0	0.0

004140 GT PL RELOC-FRAN/PRV ROW/EXTERNAL DRIVEN

Labor	0	0	0	0
Non-Labor	0	2	2	2
NSE	0	0	0	0
Total	<u>0</u>	<u>2</u>	<u>2</u>	<u>2</u>
FTE	0.0	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
004140 - GT PL RELOC-FRAN/PRV ROW/EXTERNAL DRIVEN

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00414.0
 Category: C. GAS TRANSMISSION RELOCATION
 Category-Sub: 1. GAS TRANSMISSION RELOCATION
 Workpaper Group: 004140 - GT PL RELOC-FRAN/PRV ROW/EXTERNAL DRIVEN

Summary of Results (Constant 2016 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2012	2013	2014	2015	2016	2017	2018	2019
Years									
Labor	5-YR Average	0	0	0	0	0	0	0	0
Non-Labor	5-YR Average	9	0	0	0	0	2	2	2
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		8	0	0	0	0	2	2	2
FTE	5-YR Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

This Budget Code includes costs associated with the modification and relocation of transmission pipelines to accommodate planned private property development, municipal public works and street improvement projects, and other work required due to right-of-way agreements, contract and franchise requirements.

Physical Description:

This Budget Code contains forecasts for a number of pipeline relocation projects required to meet the regulatory requirements or contract clauses of operating, right of way, franchise, and 3rd party developer agreements. Specific projects with cities and developers are not always clear during the annual budgeting process. These projects can range in magnitude from less than one hundred feet of pipe to accommodate a storm drain or sewer installation to several miles of relocated pipe, fittings, valves and appurtenances needed to accommodate residential development over large tracts of previously undeveloped land throughout our service territory. Throughout the year, SDG&E can be required to relocate pipelines during the same year the request is received by SDG&E due to the immediate needs of third party developers or municipal agencies.

Project Justification:

Pipelines are relocated according to the requirements of municipal franchises and property developers. Some are collectible and others are not, usually depending on rights of way or franchise content.

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00414.0
Category: C. GAS TRANSMISSION RELOCATION
Category-Sub: 1. GAS TRANSMISSION RELOCATION
Workpaper Group: 004140 - GT PL RELOC-FRAN/PRV ROW/EXTERNAL DRIVEN

Forecast Methodology:

Labor - 5-YR Average

Planned years are estimated at 5-yr averages. Labor amount is estimated using the last five years of recorded costs.

Non-Labor - 5-YR Average

Planned years are estimated at 5-yr averages. Non-labor amount is estimated using the last five years of recorded costs.

NSE - 5-YR Average

None.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00414.0
 Category: C. GAS TRANSMISSION RELOCATION
 Category-Sub: 1. GAS TRANSMISSION RELOCATION
 Workpaper Group: 004140 - GT PL RELOC-FRAN/PRV ROW/EXTERNAL DRIVEN

Summary of Adjustments to Forecast

In 2016 \$ (000)										
Forecast Method		Base Forecast			Forecast Adjustments			Adjusted-Forecast		
Years		2017	2018	2019	2017	2018	2019	2017	2018	2019
Labor	5-YR Average	0	0	0	0	0	0	0	0	0
Non-Labor	5-YR Average	1	1	1	1	1	1	2	2	2
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		1	1	1	1	1	1	2	2	2
FTE	5-YR Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Forecast Adjustment Details

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
2017 Total		0	0	0	0	0.0	
2018 Total		0	0	0	0	0.0	
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00414.0
 Category: C. GAS TRANSMISSION RELOCATION
 Category-Sub: 1. GAS TRANSMISSION RELOCATION
 Workpaper Group: 004140 - GT PL RELOC-FRAN/PRV ROW/EXTERNAL DRIVEN

Determination of Adjusted-Recorded:

	2012 (\$000)	2013 (\$000)	2014 (\$000)	2015 (\$000)	2016 (\$000)
Recorded (Nominal \$)*					
Labor	0	0	0	0	0
Non-Labor	9	0	0	0	0
NSE	0	0	0	0	0
Total	8	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Adjustments (Nominal \$)**					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal \$)					
Labor	0	0	0	0	0
Non-Labor	9	0	0	0	0
NSE	0	0	0	0	0
Total	8	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal \$)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016\$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016\$)					
Labor	0	0	0	0	0
Non-Labor	9	0	0	0	0
NSE	0	0	0	0	0
Total	8	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs

** Refer to "Detail of Adjustments to Recorded" page for line item adjustments

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00414.0
 Category: C. GAS TRANSMISSION RELOCATION
 Category-Sub: 1. GAS TRANSMISSION RELOCATION
 Workpaper Group: 004140 - GT PL RELOC-FRAN/PRV ROW/EXTERNAL DRIVEN

Summary of Adjustments to Recorded:

		In Nominal \$(000)				
Years	2012	2013	2014	2015	2016	
Labor	0	0	0	0	0	
Non-Labor	0	0	0	0	0	
NSE	0	0	0	0	0	
Total	0	0	0	0	0	
FTE	0.0	0.0	0.0	0.0	0.0	

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
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Note: Totals may include rounding differences.

**Beginning of Workpaper Sub Details for
Workpaper Group 004140**

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00414.0
 Category: C. GAS TRANSMISSION RELOCATION
 Category-Sub: 1. GAS TRANSMISSION RELOCATION
 Workpaper Group: 004140 - GT Stor Purifi Equip / Externally Driven
 Workpaper Detail: 004140.001 - GT PL RELOC-FRAN/PRV ROW/EXTERNAL DRIVEN
 In-Service Date: Not Applicable
 Description:

This budget code includes costs of miscellaneous capital work for Gas Transmission.

Forecast In 2016 \$(000)				
	Years	2017	2018	2019
Labor		0	0	0
Non-Labor		2	2	2
NSE		0	0	0
	Total	2	2	2
FTE		0.0	0.0	0.0

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper: VARIOUS

Summary for Category: D. GAS TRANSMISSION COMPRESSOR STATIONS

	In 2016\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	195	195	182	176
Non-Labor	9,702	4,220	3,933	3,789
NSE	0	0	0	0
Total	9,897	4,415	4,115	3,965
FTE	1.9	1.9	1.9	1.8

M04150 MP COMP STA ADD/RPL / EXTERNAL DRIVEN

Labor	132	72	72	72
Non-Labor	2,486	1,480	1,480	1,480
NSE	0	0	0	0
Total	2,618	1,552	1,552	1,552
FTE	1.3	0.7	0.7	0.7

M04350 MP COMP STA ADD/RPL /QUALITY-ECON DRIVEN

Labor	63	123	110	104
Non-Labor	7,216	2,740	2,453	2,309
NSE	0	0	0	0
Total	7,279	2,863	2,563	2,413
FTE	0.6	1.2	1.2	1.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
M04150 - MP COMP STA ADD/RPL / EXTERNAL DRIVEN

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0415.0
 Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
 Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
 Workpaper Group: M04150 - MP COMP STA ADD/RPL / EXTERNAL DRIVEN

Summary of Results (Constant 2016 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2012	2013	2014	2015	2016	2017	2018	2019
	Years								
Labor	5-YR Average	33	84	49	60	132	72	72	72
Non-Labor	5-YR Average	401	951	1,557	2,008	2,486	1,480	1,480	1,480
NSE	5-YR Average	0	0	0	0	0	0	0	0
	Total	434	1,036	1,606	2,068	2,618	1,552	1,552	1,552
FTE	5-YR Average	0.3	0.9	0.5	0.6	1.3	0.7	0.7	0.7

Business Purpose:

This Budget Code includes costs associated with the installation and replacement of compressor station equipment used in operating the transmission system. The environmental and regulations associated with the operation of compressor stations requires consistent maintenance and replacement of key engine components and controls equipment to maintain acceptable emissions levels. New air quality regulations require emissions monitoring and reporting equipment along with new catalyst and combustion technology to meet lower emission levels.

Physical Description:

Individual project scopes can consist of one or a combination of the following installations: engine control panels, oxidation catalysts, evaporative ponds, cooling tower, blowdown silencer, station auxiliary systems, turbos, station physical security, and clearance pockets.

Project Justification:

This is work conducted to remain compliant with environmental and other regulations associated with the operation of the compressor station.

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0415.0
Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M04150 - MP COMP STA ADD/RPL / EXTERNAL DRIVEN

Forecast Methodology:

Labor - 5-YR Average

Labor amount is estimated using the last five years of recorded costs.

Non-Labor - 5-YR Average

Non-labor amount is estimated using the last five years of recorded costs.

NSE - 5-YR Average

None.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0415.0
 Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
 Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
 Workpaper Group: M04150 - MP COMP STA ADD/RPL / EXTERNAL DRIVEN

Summary of Adjustments to Forecast

In 2016 \$ (000)										
Forecast Method		Base Forecast			Forecast Adjustments			Adjusted-Forecast		
Years		2017	2018	2019	2017	2018	2019	2017	2018	2019
Labor	5-YR Average	71	71	71	1	1	1	72	72	72
Non-Labor	5-YR Average	1,480	1,480	1,480	0	0	0	1,480	1,480	1,480
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		1,551	1,551	1,551	1	1	1	1,552	1,552	1,552
FTE	5-YR Average	0.7	0.7	0.7	0.0	0.0	0.0	0.7	0.7	0.7

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017 Total		0	0	0	0	0.0	
2018 Total		0	0	0	0	0.0	
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0415.0
 Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
 Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
 Workpaper Group: M04150 - MP COMP STA ADD/RPL / EXTERNAL DRIVEN

Determination of Adjusted-Recorded:

	2012 (\$000)	2013 (\$000)	2014 (\$000)	2015 (\$000)	2016 (\$000)
Recorded (Nominal \$)*					
Labor	30	65	43	52	113
Non-Labor	407	706	1,591	2,023	2,486
NSE	0	0	0	0	0
Total	437	771	1,634	2,075	2,599
FTE	0.3	0.7	0.4	0.5	1.1
Adjustments (Nominal \$)**					
Labor	0	9	0	0	0
Non-Labor	0	255	0	0	0
NSE	0	0	0	0	0
Total	0	264	0	0	0
FTE	0.0	0.1	0.0	0.0	0.0
Recorded-Adjusted (Nominal \$)					
Labor	30	74	43	52	113
Non-Labor	407	962	1,591	2,023	2,486
NSE	0	0	0	0	0
Total	437	1,035	1,634	2,075	2,599
FTE	0.3	0.8	0.4	0.5	1.1
Vacation & Sick (Nominal \$)					
Labor	4	12	7	8	19
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	4	12	7	8	19
FTE	0.0	0.1	0.1	0.1	0.2
Escalation to 2016\$					
Labor	-1	-1	-1	0	0
Non-Labor	-7	-10	-34	-15	0
NSE	0	0	0	0	0
Total	-7	-11	-35	-16	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016\$)					
Labor	33	84	49	60	132
Non-Labor	401	951	1,557	2,008	2,486
NSE	0	0	0	0	0
Total	434	1,036	1,606	2,068	2,618
FTE	0.3	0.9	0.5	0.6	1.3

* After company-wide exclusions of Non-GRC costs

** Refer to "Detail of Adjustments to Recorded" page for line item adjustments

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0415.0
 Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
 Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
 Workpaper Group: M04150 - MP COMP STA ADD/RPL / EXTERNAL DRIVEN

Summary of Adjustments to Recorded:

		In Nominal \$(000)				
Years	2012	2013	2014	2015	2016	
Labor	0	9	0	0	0	
Non-Labor	0	255	0	0	0	
NSE	0	0	0	0	0	
Total	0	264	0	0	0	
FTE	0.0	0.1	0.0	0.0	0.0	

Detail of Adjustments to Recorded in Nominal \$:

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2012 Total		0	0	0	0	0.0	
2013	Other	9	255	0	264	0.1	KMMURIL120170227134432163
Explanation:	Moved from BC 425.						
2013 Total		9	255	0	264	0.1	
2014 Total		0	0	0	0	0.0	
2015 Total		0	0	0	0	0.0	
2016 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

**Beginning of Workpaper Sub Details for
Workpaper Group M04150**

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0415.0
 Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
 Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
 Workpaper Group: M04150 - MP COMP STA ADD/RPL / EXTERNAL DRIVEN
 Workpaper Detail: M04150.001 - MP COMP STATION

In-Service Date: Not Applicable

Description:

The upgrade and replacement of outdated control technology replacement and/or upgrade of existing equipment as recommended by manufacturers, or as required by regulations.

Forecast In 2016 \$(000)				
	Years	2017	2018	2019
Labor		72	72	72
Non-Labor		1,480	1,480	1,480
NSE		0	0	0
	Total	1,552	1,552	1,552
FTE		0.7	0.7	0.7

Note: Totals may include rounding differences.

Beginning of Workpaper Group
M04350 - MP COMP STA ADD/RPL /QUALITY-ECON DRIVEN

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0435.0
 Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
 Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
 Workpaper Group: M04350 - MP COMP STA ADD/RPL /QUALITY-ECON DRIVEN

Summary of Results (Constant 2016 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2012	2013	2014	2015	2016	2017	2018	2019
	Years								
Labor	5-YR Average	154	150	119	32	63	123	110	104
Non-Labor	5-YR Average	1,284	1,020	1,256	775	7,216	2,740	2,453	2,309
NSE	5-YR Average	0	0	0	0	0	0	0	0
	Total	1,437	1,171	1,375	807	7,279	2,863	2,563	2,413
FTE	5-YR Average	1.6	1.6	1.2	0.4	0.6	1.2	1.2	1.1

Business Purpose:

Compressors are critical to maintaining reliable natural gas service to our customers. The upgrade and replacement of outdated control technology is critical to enable the station to operate at its highest efficiency.

Physical Description:

Activities include permitting, environmental and detailed engineering design. Other capital improvements includes routine and bulk work that is forecasted based on the 5 year average cost.

Project Justification:

Existing compressor station equipment has a finite life requiring regular replacement and/or upgrade, as recommended by manufacturers, or as required by operating experience, to maintain operational reliability.

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0435.0
Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M04350 - MP COMP STA ADD/RPL /QUALITY-ECON DRIVEN

Forecast Methodology:

Labor - 5-YR Average

The forecast method used for labor is the average of the most recent five years' recorded costs.

Non-Labor - 5-YR Average

The forecast method used for non-labor is the average of the most recent five years' recorded costs.

NSE - 5-YR Average

None

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0435.0
 Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
 Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
 Workpaper Group: M04350 - MP COMP STA ADD/RPL /QUALITY-ECON DRIVEN

Summary of Adjustments to Forecast

In 2016 \$ (000)										
Forecast Method		Base Forecast			Forecast Adjustments			Adjusted-Forecast		
Years		2017	2018	2019	2017	2018	2019	2017	2018	2019
Labor	5-YR Average	103	103	103	20	7	1	123	110	104
Non-Labor	5-YR Average	2,310	2,310	2,310	430	143	-1	2,740	2,453	2,309
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		2,413	2,413	2,413	450	150	0	2,863	2,563	2,413
FTE	5-YR Average	1.1	1.1	1.1	0.1	0.1	0.0	1.2	1.2	1.1

Forecast Adjustment Details

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>		
2017	FOF-Implementa	19	431	0	450	0.1	KMMURIL120170301113209237		
Explanation:		Decommissioning of Rainbow Compressor Station. Idea number 590.							
2017 Total		19	431	0	450	0.1			
2018	FOF-Implementa	6	144	0	150	0.1	KMMURIL120170301113229867		
Explanation:		Decommissioning of Rainbow Compressor Station. Idea number 590.							
2018 Total		6	144	0	150	0.1			
2019 Total		0	0	0	0	0.0			

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0435.0
Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M04350 - MP COMP STA ADD/RPL /QUALITY-ECON DRIVEN

Determination of Adjusted-Recorded:

	2012 (\$000)	2013 (\$000)	2014 (\$000)	2015 (\$000)	2016 (\$000)
Recorded (Nominal \$)*					
Labor	60	65	24	21	54
Non-Labor	1,289	1,000	1,225	781	7,216
NSE	0	0	0	0	0
Total	1,349	1,066	1,249	802	7,270
FTE	0.6	0.7	0.2	0.2	0.5
Adjustments (Nominal \$)**					
Labor	77	66	81	6	0
Non-Labor	16	31	58	0	0
NSE	0	0	0	0	0
Total	92	97	140	6	0
FTE	0.8	0.7	0.8	0.1	0.0
Recorded-Adjusted (Nominal \$)					
Labor	136	131	105	28	54
Non-Labor	1,305	1,031	1,283	781	7,216
NSE	0	0	0	0	0
Total	1,442	1,163	1,388	809	7,270
FTE	1.4	1.4	1.0	0.3	0.5
Vacation & Sick (Nominal \$)					
Labor	20	21	17	4	9
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	20	21	17	4	9
FTE	0.2	0.2	0.2	0.1	0.1
Escalation to 2016\$					
Labor	-3	-2	-3	0	0
Non-Labor	-22	-11	-28	-6	0
NSE	0	0	0	0	0
Total	-24	-13	-30	-6	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016\$)					
Labor	154	150	119	32	63
Non-Labor	1,284	1,020	1,256	775	7,216
NSE	0	0	0	0	0
Total	1,437	1,171	1,375	807	7,279
FTE	1.6	1.6	1.2	0.4	0.6

* After company-wide exclusions of Non-GRC costs

** Refer to "Detail of Adjustments to Recorded" page for line item adjustments

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0435.0
 Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
 Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
 Workpaper Group: M04350 - MP COMP STA ADD/RPL /QUALITY-ECON DRIVEN

Summary of Adjustments to Recorded:

		In Nominal \$(000)				
Years	2012	2013	2014	2015	2016	
Labor	77	66	81	6	0	
Non-Labor	16	31	58	0	0	
NSE	0	0	0	0	0	
Total	92	97	140	6	0	
FTE	0.8	0.7	0.8	0.1	0.0	

Detail of Adjustments to Recorded in Nominal \$:

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2012	Other	77	16	0	92	0.8	KMMURIL120170227142843063
Explanation: Billed Capital adjustment.							
2012 Total		77	16	0	92	0.8	
2013	Other	66	31	0	97	0.7	KMMURIL120170227143021547
Explanation: Billed capital added.							
2013 Total		66	31	0	97	0.7	
2014	Other	81	58	0	140	0.8	KMMURIL120170227143110617
Explanation: Billed capital added.							
2014 Total		81	58	0	140	0.8	
2015	Other	6	0.016	0	6	0.1	KMMURIL120170227143314847
Explanation: Billed capital added.							
2015 Total		6	0.016	0	6	0.1	
2016 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

**Beginning of Workpaper Sub Details for
Workpaper Group M04350**

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: M0435.0
 Category: D. GAS TRANSMISSION COMPRESSOR STATIONS
 Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
 Workpaper Group: M04350 - MP COMP STA ADD/RPL /QUALITY-ECON DRIVEN
 Workpaper Detail: M04350.001 - FOF - Implementation MP COMP STA ADD/RPL/QUALITY ECON DRIVEN - bulk
 In-Service Date: Not Applicable

Description:

Activities include permitting environmental and detailed engineering design for compressor replacement and upgrade , other capital improvements includes routine, bulk work that is forecasted based on the 5 year average cost. These projects are small in nature and have not yet been identified. Includes FOF Idea 590.

Forecast In 2016 \$(000)				
	Years	2017	2018	2019
Labor		123	110	104
Non-Labor		2,740	2,453	2,309
NSE		0	0	0
	Total	2,863	2,563	2,413
FTE		1.2	1.2	1.1

Note: Totals may include rounding differences.

Supplemental Workpapers for Workpaper Group M04350

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

San Diego Gas & Electric
2019 GRC – APP
Capital Workpapers

SDGE-07-CWP-SUP-01
SDG&E – Gas Transmission – Witnesses Michael A. Bermel and Beth Musich
Supplemental Workpaper Calculations for Moreno Compressor Station Replacement Activities
Compressor Replacement Workpaper
Forecasted Project Capital Investment
(\$ in thousands)

Description	Forecasted 2017	Forecasted 2018	Forecasted 2019
Labor	\$180	\$270	\$7,200
Non-Labor	\$1,820	\$2,730	\$72,800
Total	\$2,000	\$3,000	\$80,000

Total projected capital investment 2017-2019 = \$85,000

Forecasted Post-test year Project Capital Investment
(\$ in thousands)

Description	Forecasted 2020	Forecasted 2021	Forecasted 2022
Labor	\$3,250	\$3,250	\$0
Non-Labor	\$33,000	\$33,000	\$0
Total	\$36,250	\$36,250	\$0

Projected In-service Date: 12/31/2021

Description	2017-2021 Forecast	Project Total*
Labor	\$14,150	\$15,000
Non-Labor	\$143,350	\$147,000
Total	\$157,500	\$162,000

**Including 2016 Project Actuals = \$4,500*

All costs are presented in direct 2016\$ in thousands. These do not include SCG/SDG&E Overheads, Property Taxes, and/or AFUDC. Forecasted costs are preliminary and subject to change.

Project Description:

The Moreno Compressor Station currently consists of three compressor plants, as follows:

- Three Clark compressors rated at 995 Horsepower each (installed in 1955),
- Four Solar turbines rated at 1100 Horsepower each (installed in the 70's), and
- Three Cooper compressors rated at 3,000 Horsepower each (installed in the late 90's).

It operates with some aging, inefficient and high-emitting equipment that is difficult and expensive to maintain. The purpose of the Moreno Compressor Replacement project is to replace aging, inefficient equipment with new equipment that will provide additional reliability while reducing emissions and

lowering the overall operational cost of the facility. Currently the Moreno station is operating with insufficient capacity to allow the station to move the design flow of 800 million standard cubic feet per day (MMSCFD) at 440 psig suction on a peak day when any one of ten existing large compressors is out of service. This current situation poses an operation risk to SoCalGas and SDG&E's ability to meet tariff obligations and serve our customer base if any single large compressor is out of service for extended periods.

The Moreno Compressor Replacement project scope, which will ultimately be dictated by operational need, currently consists of the following:

- Install two (2) new compressor-driver units with selective catalytic reduction (SCR) emissions packages in a new compressor building (Rated at 5,000 Horsepower each),
- Decommission four (4) existing gas turbine-driven centrifugal compressors (Rated at 1,100 Horsepower each),
- Install auxiliary systems to support two (2) new turbine units,
- Install infrastructure to the 2 new turbine units that would accommodate future potential expansion to support decommissioning additional existing units and installing an additional two new turbine units if future operations require, and
- Install two (2) new 0.5 MW backup electric generators.

It is estimated that construction will begin in late 2019 with the new compressor assets in service in late 2021.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Category: E. GAS TRANSMISSION CATHODIC PROTECTION
 Workpaper: 004160

Summary for Category: E. GAS TRANSMISSION CATHODIC PROTECTION

	In 2016\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	34	22	22	22
Non-Labor	456	162	162	162
NSE	0	0	0	0
Total	490	184	184	184
FTE	0.4	0.2	0.2	0.2

004160 GT CATHODIC PROTECTION/EXTERNAL DRIVEN

Labor	34	22	22	22
Non-Labor	456	162	162	162
NSE	0	0	0	0
Total	490	184	184	184
FTE	0.4	0.2	0.2	0.2

Note: Totals may include rounding differences.

Beginning of Workpaper Group
004160 - GT CATHODIC PROTECTION/EXTERNAL DRIVEN

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00416.0
 Category: E. GAS TRANSMISSION CATHODIC PROTECTION
 Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
 Workpaper Group: 004160 - GT CATHODIC PROTECTION/EXTERNAL DRIVEN

Summary of Results (Constant 2016 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2012	2013	2014	2015	2016	2017	2018	2019
	Years								
Labor	5-YR Average	30	11	13	20	34	22	22	22
Non-Labor	5-YR Average	0	71	97	190	456	162	162	162
NSE	5-YR Average	0	0	0	0	0	0	0	0
	Total	30	82	110	210	489	184	184	184
FTE	5-YR Average	0.2	0.1	0.1	0.2	0.4	0.2	0.2	0.2

Business Purpose:

This Budget Code includes costs associated with the installation of cathodic protection equipment used to preserve the integrity of transmission pipelines by protecting them from external corrosion. These projects are mandated by federal and state minimum pipeline safety regulations, and provide for the maintenance of adequate cathodic protection on company facilities.

Physical Description:

Typical expenditures include the replacement of surface anode beds, deep well anodes and/or rectifier systems, installation of new cathodic protection stations, and applying cathodic protection to existing steel mains and service lines. Cathodic protection projects may also include the installation of new remote satellite communication technology which allows for more efficient operation and monitoring of the cathodic protection system.

Project Justification:

Application of cathodic protection provides greater system protection against corrosion. It allows SDG&E to meet Federal and State safety compliance requirements, ensuring reliability of transportation into Southern California market.

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00416.0
Category: E. GAS TRANSMISSION CATHODIC PROTECTION
Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper Group: 004160 - GT CATHODIC PROTECTION/EXTERNAL DRIVEN

Forecast Methodology:

Labor - 5-YR Average

Planned according to the last five years of recorded activity in this budget code.

Non-Labor - 5-YR Average

Planned according to the last five years of recorded activity in this budget code.

NSE - 5-YR Average

None.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00416.0
 Category: E. GAS TRANSMISSION CATHODIC PROTECTION
 Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
 Workpaper Group: 004160 - GT CATHODIC PROTECTION/EXTERNAL DRIVEN

Summary of Adjustments to Forecast

In 2016 \$ (000)										
Forecast Method		Base Forecast			Forecast Adjustments			Adjusted-Forecast		
Years		2017	2018	2019	2017	2018	2019	2017	2018	2019
Labor	5-YR Average	21	21	21	1	1	1	22	22	22
Non-Labor	5-YR Average	162	162	162	0	0	0	162	162	162
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		183	183	183	1	1	1	184	184	184
FTE	5-YR Average	0.2	0.2	0.2	0.0	0.0	0.0	0.2	0.2	0.2

Forecast Adjustment Details

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
2017 Total		0	0	0	0	0.0	
2018 Total		0	0	0	0	0.0	
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00416.0
 Category: E. GAS TRANSMISSION CATHODIC PROTECTION
 Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
 Workpaper Group: 004160 - GT CATHODIC PROTECTION/EXTERNAL DRIVEN

Determination of Adjusted-Recorded:

	2012 (\$000)	2013 (\$000)	2014 (\$000)	2015 (\$000)	2016 (\$000)
Recorded (Nominal \$)*					
Labor	27	10	12	18	29
Non-Labor	0	72	99	191	456
NSE	0	0	0	0	0
Total	27	81	110	209	484
FTE	0.2	0.1	0.1	0.2	0.3
Adjustments (Nominal \$)**					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal \$)					
Labor	27	10	12	18	29
Non-Labor	0	72	99	191	456
NSE	0	0	0	0	0
Total	27	81	110	209	484
FTE	0.2	0.1	0.1	0.2	0.3
Vacation & Sick (Nominal \$)					
Labor	4	2	2	3	5
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	4	2	2	3	5
FTE	0.0	0.0	0.0	0.0	0.1
Escalation to 2016\$					
Labor	-1	0	0	0	0
Non-Labor	0	-1	-2	-1	0
NSE	0	0	0	0	0
Total	-1	-1	-2	-2	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016\$)					
Labor	30	11	13	20	34
Non-Labor	0	71	97	190	456
NSE	0	0	0	0	0
Total	30	82	110	210	489
FTE	0.2	0.1	0.1	0.2	0.4

* After company-wide exclusions of Non-GRC costs

** Refer to "Detail of Adjustments to Recorded" page for line item adjustments

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00416.0
 Category: E. GAS TRANSMISSION CATHODIC PROTECTION
 Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
 Workpaper Group: 004160 - GT CATHODIC PROTECTION/EXTERNAL DRIVEN

Summary of Adjustments to Recorded:

		In Nominal \$(000)				
Years	2012	2013	2014	2015	2016	
Labor	0	0	0	0	0	
Non-Labor	0	0	0	0	0	
NSE	0	0	0	0	0	
Total	0	0	0	0	0	
FTE	0.0	0.0	0.0	0.0	0.0	

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
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Note: Totals may include rounding differences.

**Beginning of Workpaper Sub Details for
Workpaper Group 004160**

San Diego Gas & Electric Company
 2019 GRC - REVISED
 Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00416.0
 Category: E. GAS TRANSMISSION CATHODIC PROTECTION
 Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
 Workpaper Group: 004160 - GT CATHODIC PROTECTION/EXTERNAL DRIVEN
 Workpaper Detail: 004160.001 - RAMP - BASE GT CATHODIC PROTECTION/EXTERNAL DRIVEN
 In-Service Date: 12/31/2019
 Description:

Application of cathodic protection to protect Transmission pipelines against external corrosion.

Forecast In 2016 \$(000)				
	Years	<u>2017</u>	<u>2018</u>	<u>2019</u>
Labor		22	22	22
Non-Labor		162	162	162
NSE		0	0	0
	Total	184	184	184
FTE		0.2	0.2	0.2

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00416.0
 Category: E. GAS TRANSMISSION CATHODIC PROTECTION
 Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
 Workpaper Group: 004160 - GT CATHODIC PROTECTION/EXTERNAL DRIVEN
 Workpaper Detail: 004160.001 - RAMP - BASE GT CATHODIC PROTECTION/EXTERNAL DRIVEN

RAMP Item # 1

RAMP Chapter: SDG&E-10

Program Name: Cathodic Protection

Program Description: Install cathodic protection (anodes, rectifiers, etc.) to protect high pressure pipelines

Risk/Mitigation:

Risk: Pipeline Failure

Mitigation: Requirements for corrosion control.

Forecast CPUC Cost Estimates (\$000)

	<u>2017</u>	<u>2018</u>	<u>2019</u>
Low	184	184	184
High	184	184	184

Funding Source: CPUC-GRC

Forecast Method: Base Year

Work Type: Mandated

Work Type Citation: DOT

Historical Embedded Cost Estimates (\$000)

Embedded Costs: 184

Explanation:

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Category: F. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
 Workpaper: 004180

Summary for Category: F. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS

	In 2016\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	74	62	62	62
Non-Labor	608	423	423	423
NSE	0	0	0	0
Total	682	485	485	485
FTE	0.8	0.7	0.7	0.7

004180 M&R Stations

Labor	74	62	62	62
Non-Labor	608	423	423	423
NSE	0	0	0	0
Total	682	485	485	485
FTE	0.8	0.7	0.7	0.7

Note: Totals may include rounding differences.

**Beginning of Workpaper Group
004180 - M&R Stations**

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00418.0
 Category: F. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
 Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
 Workpaper Group: 004180 - M&R Stations

Summary of Results (Constant 2016 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2012	2013	2014	2015	2016	2017	2018	2019
Years									
Labor	5-YR Average	30	94	88	21	74	62	62	62
Non-Labor	5-YR Average	477	148	655	225	608	423	423	423
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		507	242	743	246	683	485	485	485
FTE	5-YR Average	0.3	1.1	1.0	0.2	0.8	0.7	0.7	0.7

Business Purpose:

This Budget Code includes costs of installing and rebuilding large meter set assemblies (MSAs) for transmission-served customers and pressure limiting stations residing on the gas transmission system. These assets require replacement for three principal reasons: aging, change in use patterns and/or population encroachment, and enhancement of the transmission system to contend with gas quality and capacity issues. The capital work sustains reliable operation of critical transmission assets to the extent that they are not compromised by equipment deployed past its useful life. This includes periodic replacement of local field measurement and control equipment directly linking with Gas Operations SCADA system via remote communications.

Physical Description:

Typical expenditures includes the instrumentation necessary for the metering or regulating of natural gas in connection with transmission operations and, in particular, costs associated with additions or replacements of station piping, valves, regulators, control and communications equipment, shelters and enclosures.

Project Justification:

Requested funding includes installation of new meter and regulation equipment associated with operation of the transmission pipeline system. It includes gas meters installed to help manage gas flows and quality on the transmission system, and to provide operating information to gas operations control personnel remotely managing the gas delivery system. Also included in this category are regulating stations used to control and limit gas pressure and the flow of gas within the gas transmission system, such as city gate stations. The installation of this equipment is associated with the safe and reliable local operation of SoCalGas pipelines in conformance with DOT and CPUC requirements for the limiting of pipeline and vessel operating pressures. All pipelines must be operated within their maximum allowable operating pressure parameters, and this equipment, whether for newly-installed pipelines or, where replacement is warranted, sustains this compliance and operating integrity.

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00418.0
Category: F. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 004180 - M&R Stations

Forecast Methodology:

Labor - 5-YR Average

The forecast reflects a base year 2016 amount. The 2016 base year represents actual estimated activity. The Non-labor amount was determined using the Labor/Non-Labor ratio in the most recent recorded year.

Non-Labor - 5-YR Average

The forecast reflects a base year 2016 amount. The 2016 base year represents actual estimated activity. The Non-labor amount was determined using the Labor/Non-Labor ratio in the most recent recorded year.

NSE - 5-YR Average

None

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

Area: GAS TRANSMISSION
 Witness: Elizabeth A. Musich
 Budget Code: 00418.0
 Category: F. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
 Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
 Workpaper Group: 004180 - M&R Stations

Summary of Adjustments to Forecast

In 2016 \$ (000)										
Forecast Method		Base Forecast			Forecast Adjustments			Adjusted-Forecast		
Years		2017	2018	2019	2017	2018	2019	2017	2018	2019
Labor	5-YR Average	61	61	61	1	1	1	62	62	62
Non-Labor	5-YR Average	422	422	422	1	1	1	423	423	423
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		483	483	483	2	2	2	485	485	485
FTE	5-YR Average	0.7	0.7	0.7	0.0	0.0	0.0	0.7	0.7	0.7

Forecast Adjustment Details

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
2017 Total		0	0	0	0	0.0	
2018 Total		0	0	0	0	0.0	
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

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Determination of Adjusted-Recorded:

	2012 (\$000)	2013 (\$000)	2014 (\$000)	2015 (\$000)	2016 (\$000)
Recorded (Nominal \$)*					
Labor	27	82	78	19	64
Non-Labor	485	150	669	226	608
NSE	0	0	0	0	0
Total	512	232	747	245	672
FTE	0.3	0.9	0.8	0.2	0.7
Adjustments (Nominal \$)**					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal \$)					
Labor	27	82	78	19	64
Non-Labor	485	150	669	226	608
NSE	0	0	0	0	0
Total	512	232	747	245	672
FTE	0.3	0.9	0.8	0.2	0.7
Vacation & Sick (Nominal \$)					
Labor	4	13	12	3	11
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	4	13	12	3	11
FTE	0.0	0.2	0.2	0.0	0.1
Escalation to 2016\$					
Labor	-1	-1	-2	0	0
Non-Labor	-8	-2	-14	-2	0
NSE	0	0	0	0	0
Total	-9	-3	-16	-2	0
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016\$)					
Labor	30	94	88	21	74
Non-Labor	477	148	655	225	608
NSE	0	0	0	0	0
Total	507	242	743	246	683
FTE	0.3	1.1	1.0	0.2	0.8

* After company-wide exclusions of Non-GRC costs

** Refer to "Detail of Adjustments to Recorded" page for line item adjustments

Note: Totals may include rounding differences.

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 Workpaper Group: 004180 - M&R Stations

Summary of Adjustments to Recorded:

In Nominal \$(000)					
Years	2012	2013	2014	2015	2016
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	0	0	0	0	0
FTE	0.0	0.0	0.0	0.0	0.0

<u>Year</u>	<u>Adj Group</u>	<u>Labor</u>	<u>NLbr</u>	<u>NSE</u>	<u>Total</u>	<u>FTE</u>	<u>RefID</u>
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Note: Totals may include rounding differences.

**Beginning of Workpaper Sub Details for
Workpaper Group 004180**

San Diego Gas & Electric Company
2019 GRC - REVISED
Capital Workpapers

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 Category: F. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
 Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
 Workpaper Group: 004180 - M&R Stations
 Workpaper Detail: 004180.001 - GT M&R STA ADD/RPL / EXTERNAL DRIVEN

In-Service Date: 12/31/2019

Description:

Installation of new meter and regulation equipment associated with operation of the Transmission pipeline system. Meter and regulator stations require replacement for three principal reasons: aging, change in use patterns and/or population encroachment, and enhancement of the transmission system to contend with gas quality and capacity issues.

Forecast In 2016 \$(000)			
Years	2017	2018	2019
Labor	62	62	62
Non-Labor	423	423	423
NSE	0	0	0
Total	485	485	485
FTE	0.7	0.7	0.7

Note: Totals may include rounding differences.