Application of SOUTHERN CALIFORNIA GAS)
COMPANY for authority to update its gas revenue)
requirement and base rates)
effective January 1, 2019 (U 904-G))

Application No. 17-10-___

Exhibit No.: (SCG-07-CWP)

CAPITAL WORKPAPERS TO
PREPARED DIRECT TESTIMONY
OF ELIZABETH A. MUSICH / MICHAEL A. BERMEL
ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

OCTOBER 2017

SoCalGas

A Sempra Energy utility

2019 General Rate Case - APP

INDEX OF WORKPAPERS

Exhibit SCG-07-CWP - GAS TRANSMISSION

Overall Summary For Exhibit No. SCG-07-CWP

Area:	**GAS TRANSMISSION**
Witness:	**Elizabeth A. Musich**

	In 2016 $ (000)		
	Adjusted-Forecast		
	2017	2018	2019
A. GAS TRANSMISSION NEW PIPELINE	8,543	7,383	7,383
B. GAS TRANSMISSION REPLACEMENT PIPELINES	30,194	26,358	10,499
C. GAS TRANSMISSION FREEWAY RELOCATIONS	12	12	88
D. GAS TRANSMISSION RELOCATIONS	11,584	10,464	5,834
E. GAS TRANSMISSION COMPRESSOR STATIONS	13,294	19,351	12,626
F. GAS TRANSMISSION COMPRESSOR STATIONS	37,138	84,000	104,000
G. GAS TRANSMISSION CATHODIC PROTECTION	5,000	6,235	6,658
H. GAS TRANSMISSION MEASUREMENT & REGULATION S	18,938	18,938	18,938
I. GAS TRANSMISSION AUXILIARY EQUIPMENT	10,710	9,096	12,750
Total	**135,413**	**181,837**	**178,776**

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: A. GAS TRANSMISSION NEW PIPELINE
Workpaper: 003010

Summary for Category: A. GAS TRANSMISSION NEW PIPELINE

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	784	763	535	535
Non-Labor	4,201	7,780	6,848	6,848
NSE	0	0	0	0
Total	**4,985**	**8,543**	**7,383**	**7,383**
FTE	6.4	7.2	5.1	5.1

003010 GT - New Construction

Labor	784	763	535	535
Non-Labor	4,201	7,780	6,848	6,848
NSE	0	0	0	0
Total	**4,985**	**8,543**	**7,383**	**7,383**
FTE	6.4	7.2	5.1	5.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
003010 - GT - New Construction

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00301.0
Category: A. GAS TRANSMISSION NEW PIPELINE
Category-Sub: 1. GAS TRANSMISSION NEW PIPELINE
Workpaper Group: 003010 - GT - New Construction

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	5-YR Average	1,076	529	119	167	784	763	535	535
Non-Labor	5-YR Average	24,720	3,710	-192	1,801	4,201	7,780	6,848	6,848
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**25,796**	**4,239**	**-74**	**1,969**	**4,985**	**8,543**	**7,383**	**7,383**
FTE	5-YR Average	11.1	5.4	1.2	1.5	6.4	7.2	5.1	5.1

Business Purpose:

New Construction Pipeline is required to provide the backbone and local natural gas transmission system with additional resiliency, capacity, and reliability in order to serve new or increased loads and/or to provide natural gas supply reinforcement to an existing area.

Physical Description:

(003010.01 El Segundo Loop) - Installation of new pipe, valves, and fittings conecting existing transmission pipelines on the east in the City of El Segundo thereby creating a transmission pipeline "loop" in the El Segundo area. This solution provides not only the necessary incremental capacity but a level of redundancy that is currently lacking, insuring more reliable service.

(003010.02 Blanket WOA) - multiple smaller Transmission pipeline projects that arise typically on short notice.

Project Justification:

For the El Segundo loop specifically, recent load growth have taxed the capacity of the transmission lines serving the area. Two major power plant facilities have new "quick-start" technology, which will result in sudden and dramatic increases in demand on our system. System improvement is necessary to sustain continued, uninterrupted reliable gas service to the area.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00301.0
Category:	A. GAS TRANSMISSION NEW PIPELINE
Category-Sub:	1. GAS TRANSMISSION NEW PIPELINE
Workpaper Group:	003010 - GT - New Construction

Forecast Methodology:

Labor - 5-YR Average

Estimate for labor is established according to the 5-yr recorded percentage of project direct costs. The 2017 forecast increased the 5 year average to account for the addtional cost forecasted to complete El Segundo Loop.

Non-Labor - 5-YR Average

Estimate for non labor is established according to the 5-yr recorded percentage of project direct costs. The 2017 forecast increased the 5 year average to account for the addtional cost forecasted to complete El Segundo Loop.

NSE - 5-YR Average

Not applicable

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00301.0
Category: A. GAS TRANSMISSION NEW PIPELINE
Category-Sub: 1. GAS TRANSMISSION NEW PIPELINE
Workpaper Group: 003010 - GT - New Construction

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	534	534	534	229	1	1	763	535	535
Non-Labor	5-YR Average	6,847	6,847	6,847	933	1	1	7,780	6,848	6,848
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**7,381**	**7,381**	**7,381**	**1,162**	**2**	**2**	**8,543**	**7,383**	**7,383**
FTE	5-YR Average	5.1	5.1	5.1	2.1	0.0	0.0	7.2	5.1	5.1

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	228	932	0	1,160	2.1	KMMURIL120161130092449190
Explanation:	El Segundo Loop cost for 2017.						
2017 Total		228	932	0	1,160	2.1	
2018 Total		0	0	0	0	0.0	
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00301.0
Category: A. GAS TRANSMISSION NEW PIPELINE
Category-Sub: 1. GAS TRANSMISSION NEW PIPELINE
Workpaper Group: 003010 - GT - New Construction

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	943	459	104	145	673
Non-Labor	25,135	3,750	-196	1,815	4,201
NSE	0	0	0	0	0
Total	**26,078**	**4,208**	**-92**	**1,960**	**4,874**
FTE	9.5	4.6	1.0	1.3	5.5
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	943	459	104	145	673
Non-Labor	25,135	3,750	-196	1,815	4,201
NSE	0	0	0	0	0
Total	**26,078**	**4,208**	**-92**	**1,960**	**4,874**
FTE	9.5	4.6	1.0	1.3	5.5
Vacation & Sick (Nominal $)					
Labor	151	76	17	23	111
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**151**	**76**	**17**	**23**	**111**
FTE	1.6	0.8	0.2	0.2	0.9
Escalation to 2016$					
Labor	-18	-6	-3	-1	0
Non-Labor	-415	-40	4	-14	0
NSE	0	0	0	0	0
Total	**-433**	**-46**	**2**	**-15**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	1,076	529	119	167	784
Non-Labor	24,720	3,710	-192	1,801	4,201
NSE	0	0	0	0	0
Total	**25,796**	**4,239**	**-74**	**1,969**	**4,985**
FTE	11.1	5.4	1.2	1.5	6.4

* 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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00301.0
Category: A. GAS TRANSMISSION NEW PIPELINE
Category-Sub: 1. GAS TRANSMISSION NEW PIPELINE
Workpaper Group: 003010 - GT - New Construction

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

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 003010

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00301.0
Category: A. GAS TRANSMISSION NEW PIPELINE
Category-Sub: 1. GAS TRANSMISSION NEW PIPELINE
Workpaper Group: 003010 - GT - New Construction
Workpaper Detail: 003010.001 - L1170/1172 El Segundo Loop

In-Service Date: 04/30/2017

Description:

Add needed capacity and redundancy to the local Transmission piping system needed to serve two utility-owned electric generation plants, a local refinery, and new demand from a wastewater treatment facility. This entails installing new pipe, valves and fittings connecting three pipelines in the City of El Segundo, creating a transmission pipeline "loop" in the El Segundo area. This solution provides not only the necessary incremental capacity but a level of redundancy that is currently lacking, insuring more reliable service.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	763	0	0
Non-Labor	7,774	0	0
NSE	0	0	0
Total	**8,537**	**0**	**0**
FTE	7.2	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00301.0
Category: A. GAS TRANSMISSION NEW PIPELINE
Category-Sub: 1. GAS TRANSMISSION NEW PIPELINE
Workpaper Group: 003010 - GT - New Construction
Workpaper Detail: 003010.002 - Blanket WOA

In-Service Date: Not Applicable

Description:

Provide funding for as-yet unidentified smaller and short-notice new Transmission projects.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	535	535
Non-Labor	6	6,848	6,848
NSE	0	0	0
Total	**6**	**7,383**	**7,383**
FTE	0.0	5.1	5.1

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper: M03120

Summary for Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	1,637	2,850	2,488	991
Non-Labor	14,927	27,344	23,870	9,508
NSE	0	0	0	0
Total	**16,564**	**30,194**	**26,358**	**10,499**
FTE	14.3	26.0	23.0	9.0

M03120 MP PL Rpls / Externally Driven

Labor	1,637	2,850	2,488	991
Non-Labor	14,927	27,344	23,870	9,508
NSE	0	0	0	0
Total	**16,564**	**30,194**	**26,358**	**10,499**
FTE	14.3	26.0	23.0	9.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
M03120 - MP PL Rpls / Externally Driven

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	254	389	550	1,838	1,637	2,850	2,488	991
Non-Labor	Zero-Based	4,039	4,182	4,642	17,020	14,927	27,344	23,870	9,508
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**4,294**	**4,571**	**5,192**	**18,857**	**16,564**	**30,194**	**26,358**	**10,499**
FTE	Zero-Based	2.7	3.7	5.4	16.8	14.3	26.0	23.0	9.0

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 seperate work papers. Also included are projects to replace pipelines due to class location changes.

Project Justification:

Estimates are higher than the 5 year average and are based on the experience and judgement of local pipeline personnel with knowledge trends in construction costs and materials performance. Forecasted costs for 2017 and 2018 include projects identified by pipeline personnel, 2019 is slightly higher than the 5 year average.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven

Forecast Methodology:

Labor - Zero-Based

Calculated as a percentage of total direct project costs. Project costs are based on recorded projects of similar scope, pipe size and environment.

Non-Labor - Zero-Based

Project costs are based on recorded projects of similar scope, environment, pipe size and workforce deployment.

NSE - Zero-Based

None.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / 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	2,850	2,488	991	0	0	0	2,850	2,488	991
Non-Labor	Zero-Based	27,344	23,870	9,508	0	0	0	27,344	23,870	9,508
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**30,194**	**26,358**	**10,499**	**0**	**0**	**0**	**30,194**	**26,358**	**10,499**
FTE	Zero-Based	26.0	23.0	9.0	0.0	0.0	0.0	26.0	23.0	9.0

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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	191	301	483	1,575	1,393
Non-Labor	3,916	3,758	4,742	17,119	14,244
NSE	0	0	0	0	0
Total	**4,107**	**4,059**	**5,225**	**18,694**	**15,637**
FTE	2.0	2.9	4.6	14.2	12.1
Adjustments (Nominal $) **					
Labor	32	36	0	19	12
Non-Labor	191	469	2	30	683
NSE	0	0	0	0	0
Total	**223**	**506**	**2**	**49**	**695**
FTE	0.3	0.3	0.0	0.2	0.1
Recorded-Adjusted (Nominal $)					
Labor	223	337	483	1,594	1,405
Non-Labor	4,107	4,228	4,744	17,149	14,927
NSE	0	0	0	0	0
Total	**4,330**	**4,565**	**5,227**	**18,743**	**16,332**
FTE	2.3	3.2	4.6	14.4	12.2
Vacation & Sick (Nominal $)					
Labor	36	56	79	258	231
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**36**	**56**	**79**	**258**	**231**
FTE	0.4	0.5	0.8	2.4	2.1
Escalation to 2016$					
Labor	-4	-4	-12	-14	0
Non-Labor	-68	-45	-102	-129	0
NSE	0	0	0	0	0
Total	**-72**	**-49**	**-114**	**-143**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	254	389	550	1,838	1,637
Non-Labor	4,039	4,182	4,642	17,020	14,927
NSE	0	0	0	0	0
Total	**4,294**	**4,571**	**5,192**	**18,857**	**16,564**
FTE	2.7	3.7	5.4	16.8	14.3

* 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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	32	36	0	19	12
Non-Labor	191	469	2	30	683
NSE	0	0	0	0	0
Total	**223**	**506**	**2**	**49**	**695**
FTE	0.3	0.3	0.0	0.2	0.1

Detail of Adjustments to Recorded in Nominal $:

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2012	Other	32	191	0	223	0.3	KMMURIL120170228084214350
Explanation:	Moved from M03020						
2012 Total		32	191	0	223	0.3	
2013	Other	0	375	0	375	0.0	NMOATAZE20170224102954177
Explanation:	This adjustment was made to transfer expenditures from budget code 312 in Gas Engineering witness area, to the proper witness sponsor, in Major Projects, which is sponsoring BC 312.						
2013	Other	36	94	0	131	0.3	KMMURIL120170228084354623
Explanation:	Moved from M3020						
2013 Total		36	469	0	506	0.3	
2014	Other	0	5	0	5	0.0	NMOATAZE20170224103040063
Explanation:	This adjustment was made to transfer expenditures from budget code 312 in Gas Engineering witness area, to the proper witness sponsor, in Major Projects, which is sponsoring BC 312.						
2014	Other	0	-3	0	-3	0.0	KMMURIL120170228084537680
Explanation:	Moved from M03020						
2014 Total		0	2	0	2	0.0	
2015	Other	19	30	0	49	0.2	NMOATAZE20170224103121110
Explanation:	This adjustment was made to transfer expenditures from budget code 312 in Gas Engineering witness area, to the proper witness sponsor, in Major Projects, which is sponsoring BC 312.						
2015 Total		19	30	0	49	0.2	

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven

Year	Adj_Group	Labor	NLbr	NSE	Total	FTE	RefID
2016	Other	12	683	0	695	0.1	NMOATAZE20170224103156863
Explanation:	This adjustment was made to transfer expenditures from budget code 312 in Gas Engineering witness area, to the proper witness sponsor, in Major Projects, which is sponsoring BC 312.						
2016 Total		12	683	0	695	0.1	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group M03120

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven
Workpaper Detail:	M03120.001 - L293 Class Location Change Replace Lone Star
In-Service Date:	05/31/2017

Description:

Relocation of Line 293 due to class location change.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	476	0	0
Non-Labor	4,563	0	0
NSE	0	0	0
Total	**5,039**	**0**	**0**
FTE	4.4	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven
Workpaper Detail:	M03120.002 - L1014 MP 12.73 Relocation Del Amo
In-Service Date:	07/31/2017

Description:

Relocate approximately 1300 ft of 30 pipeline away from the adjacent neighborhood and into the Cal Trans right of way in order to facilitate the operation and maintanance of the pipeline. No acquisition costs are associated with the longitudinal encroachment.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	519	0	0
Non-Labor	4,981	0	0
NSE	0	0	0
Total	**5,500**	**0**	**0**
FTE	4.8	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.003 - L2000 CLC in Beaumont

In-Service Date: 11/30/2017

Description:

Due to class location change replacement of approximately 2500 ft. of 30" pipeline is required.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	283	0	0
Non-Labor	2,717	0	0
NSE	0	0	0
Total	**3,000**	**0**	**0**
FTE	2.6	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven
Workpaper Detail:	M03120.004 - L2000 CLC STA 782316.10 to 784738.02
In-Service Date:	11/30/2017

Description:

Replace approximately 800 ft. of 30 pipeline due to a change in class location.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	179	0	0
Non-Labor	1,721	0	0
NSE	0	0	0
Total	**1,900**	**0**	**0**
FTE	1.7	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.005 - L247 Location Class Change Repl Ocean Mesa

In-Service Date: 04/30/2017

Description:

Replace approximately 1200 feet of 16 pipe due to change in class location. L-247 can not be shut-in, so a temporary above ground bypass installation will be required.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	141	0	0
Non-Labor	1,350	0	0
NSE	0	0	0
Total	**1,491**	**0**	**0**
FTE	1.3	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.006 - L1185 CL Remediation Adelanto to Cajon Pass

In-Service Date: 02/28/2017

Description:

An insulator has developed a leak and it is not repairable.This project involves removing the segment of 36" pipe containing the insulator and replacing it with a cylinder. The insulator is no longer needed at this location.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	198	0	0
Non-Labor	1,902	0	0
NSE	0	0	0
Total	**2,100**	**0**	**0**
FTE	1.8	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.007 - L2001 CLC in Palm Springs

In-Service Date: 11/30/2017

Description:

Replace approximately 750ft of 30-inch L-2001 due to a change in class location.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	118	0	0
Non-Labor	1,132	0	0
NSE	0	0	0
Total	**1,250**	**0**	**0**
FTE	1.1	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.009 - L2000 CLC Woodard Gorge Riverside

In-Service Date: 06/30/2017

Description:

Relocate segment of L2000 to accommodate a new development.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	94	0	0
Non-Labor	906	0	0
NSE	0	0	0
Total	**1,000**	**0**	**0**
FTE	0.9	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.010 - L6916 Exposure Repair at MP 121.3

In-Service Date: 04/30/2018

Description:

Repair exposed section of 16 pipeline.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	94	0
Non-Labor	0	906	0
NSE	0	0	0
Total	**0**	**1,000**	**0**
FTE	0.0	0.9	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven
Workpaper Detail:	M03120.011 - L1018 Leaking Tap Valves MP 4.12 (Harvard Ave)
In-Service Date:	04/30/2017

Description:

Replace two leaking tap valves off Pipeline 1018 located n/o harvard, s/o the Metrolink crossing. Nearest cross street is Deerfield Ave. One (1) valve is 4-inch ball valve, 1018-4.12-0, and one (1) is a 3-inch ball valve, 1018-4. 13-3. Change in scope - L1018 cannot be shut in and temporary 12" bypass will be installed. In addition, 3" valve 1018-14.3-3 will be removed instead of replaced. This will require replacing a spool of 30" L1018 for the purpose of cutting out the tap.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	92	0	0
Non-Labor	879	0	0
NSE	0	0	0
Total	**971**	**0**	**0**
FTE	0.8	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.012 - L1003 Corrosion Pit Repair MP 25.54

In-Service Date: 05/31/2017

Description:

Replace 100-ft of 16-inch pipeline. The location of the corrosion pit is in the city of La Cochinta at MP 25.54.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	89	0	0
Non-Labor	856	0	0
NSE	0	0	0
Total	**945**	**0**	**0**
FTE	0.8	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.013 - L103 Exposure Mitigation at MP 1.39

In-Service Date: 12/31/2018

Description:

Approximately 300 feet of 10-inch pipeline is exposed as a result of a surface erosion. Protect exisiting line in place by installation of Submar Revetment Matting protection system.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	89	0
Non-Labor	0	851	0
NSE	0	0	0
Total	**0**	**940**	**0**
FTE	0.0	0.8	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.014 - L133 Corroded Pipeline at MP 3.22

In-Service Date: 02/28/2017

Description:

Replace approximately 40 feet of 10-inch pipeline due to severe corrosion, and remove existing drip segment. The corrosion location is in Kern County at approximately MP 3.22.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	82	0	0
Non-Labor	781	0	0
NSE	0	0	0
Total	**863**	**0**	**0**
FTE	0.7	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven
Workpaper Detail:	M03120.015 - L247 Location Class Change Replacement Ocean Mesa
In-Service Date:	12/31/2018

Description:

Replace approximately 1200 feet of 16 pipe due to change in class location. Segment impacted is from station 68844.65 to station 69940.57, adjacent to Ocean Mesa RV and Campground, L-247 can not be shut in, so a temoporary above ground bypass installation will be required.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	509	0
Non-Labor	0	4,883	0
NSE	0	0	0
Total	**0**	**5,392**	**0**
FTE	0.0	4.7	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven
Workpaper Detail:	M03120.016 - L235 & L335 Exposed Pipe - Palmdale
In-Service Date:	10/31/2017

Description:

Approximately 100-feet of 30-inch pipeline is exposed as a result of surface erosion at MP 219.44 and MP 221.29. The exposure length at each location is approximately 50-feet .Protect the exisiting line in place by installation of Submar Revetment Matting protection system.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	85	0	0
Non-Labor	815	0	0
NSE	0	0	0
Total	**900**	**0**	**0**
FTE	0.8	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven
Workpaper Detail:	M03120.017 - Gas Transmission Pipeline Replacements/Externally Driven (Bundle)
In-Service Date:	Not Applicable

Description:

These projects include bundle contains multiple smaller projects that are individually scoped and but do not warrant an individual workpaper.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	755	813
Non-Labor	0	7,245	7,796
NSE	0	0	0
Total	**0**	**8,000**	**8,609**
FTE	0.0	7.1	7.4

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.018 - L2000 CLC Segments (Replace Seg 18 & 19)

In-Service Date: 05/31/2018

Description:

There are multiple class location segments along Line 2000 that require remediation due to development that has occured near the pipeline.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	189	0
Non-Labor	0	1,811	0
NSE	0	0	0
Total	**0**	**2,000**	**0**
FTE	0.0	1.7	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven
Workpaper Detail:	M03120.019 - 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. Typically, transmission pipelines are replaced due to either condition of the exisiting pipeline or hazardous condition affecting the existing pipeline location.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	371	852	178
Non-Labor	3,564	8,174	1,712
NSE	0	0	0
Total	**3,935**	**9,026**	**1,890**
FTE	3.2	7.8	1.6

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0312.0
Category: B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub: 1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group: M03120 - MP PL Rpls / Externally Driven
Workpaper Detail: M03120.019 - RAMP - Base Blanket WOA

RAMP Item # 1

RAMP Chapter: SCG-4

Program Name: HCA Class Location Follow-up Mitigation

Program Description: HCAs for natural gas pipelines 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

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	5,000	5,000	5,000
High	5,000	5,000	5,000

Funding Source: Other

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n/a

Historical Embedded Cost Estimates ($000)

Embedded Costs: 5000

Explanation:

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0312.0
Category:	B. GAS TRANSMISSION REPLACEMENT PIPELINES
Category-Sub:	1. GAS TRANSMISSION REPLACEMENT PIPELINES
Workpaper Group:	M03120 - MP PL Rpls / Externally Driven
Workpaper Detail:	M03120.020 - L85 MLV Wood Vault Replacement at MP 72.59
In-Service Date:	02/28/2017

Description:

Pipeline 85 existing 24-inch valve leaking out through the slip flange fitting, the assembly is original 1930's vintage and the current wooden vault is deteriorated. The main line valve, two blow down valves, related piping and wooden vault will be replaced. Pipeline 85 can not be shut-in and a temporary 6-inch bypass will be installed.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	123	0	0
Non-Labor	1,177	0	0
NSE	0	0	0
Total	**1,300**	**0**	**0**
FTE	1.1	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: C. GAS TRANSMISSION FREEWAY RELOCATIONS
Workpaper: 003130

Summary for Category: C. GAS TRANSMISSION FREEWAY RELOCATIONS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	4	1	1	1
Non-Labor	0	11	11	87
NSE	0	0	0	0
Total	**4**	**12**	**12**	**88**
FTE	0.0	0.1	0.1	0.8

003130 GT PL Reloc-Fway / Externally Driven

Labor	4	1	1	1
Non-Labor	0	11	11	87
NSE	0	0	0	0
Total	**4**	**12**	**12**	**88**
FTE	0.0	0.1	0.1	0.8

Note: Totals may include rounding differences.

Beginning of Workpaper Group
003130 - GT PL Reloc-Fway / Externally Driven

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00313.0
Category: C. GAS TRANSMISSION FREEWAY RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION FREEWAY RELOCATIONS
Workpaper Group: 003130 - GT PL Reloc-Fway / Externally Driven

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	6	9	4	1	1	1
Non-Labor	Zero-Based	13	0	0	0	0	11	11	87
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**13**	**0**	**6**	**9**	**4**	**12**	**12**	**88**
FTE	Zero-Based	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.8

Business Purpose:

This Budget Code includes costs associated with pipeline and associated facility relocations necessitated by Caltrans construction projects. Included here are historic and forecast costs in Budget Codes 303, 313, 323, and 333.

Physical Description:

Relocate and replace pipelines and related facilities found to be in conflict with Caltrans construction projects. Individual projects will vary from less than $10,000 to as high as multiple hundreds of thousands of dollars.

Project Justification:

Meet operating, right of way, and franchise agreement requirements. Throughout the year, SoCalGas is frequently required to relocate pipelines during the same year such projects are submitted to SoCalGas. Costs are driven by safety and regulatory compliance as well as contractual requirements.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00313.0
Category:	C. GAS TRANSMISSION FREEWAY RELOCATIONS
Category-Sub:	1. GAS TRANSMISSION FREEWAY RELOCATIONS
Workpaper Group:	003130 - GT PL Reloc-Fway / Externally Driven

Forecast Methodology:

Labor - Zero-Based

Labor costs for this project consist of planning and engineering for the relocation of pipeline in the Corona area due to the widening of State Highway 71. The estimate was prepared by personnel experienced in this type of work and with reference to recent projects of similar scope, pipe size, and construction environment.

Non-Labor - Zero-Based

Non-labor costs for this project consist of contracted labor and equipment, and materials such as pipe, valves, elbows, and casing. The estimate was prepared by personnel experienced in this type of work and with reference to recent projects of similar scope, pipe size and construction environment.

NSE - Zero-Based

None. These costs are for Transmission pipeline relocations.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00313.0
Category: C. GAS TRANSMISSION FREEWAY RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION FREEWAY RELOCATIONS
Workpaper Group: 003130 - GT PL Reloc-Fway / 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	1	1	1	0	0	0	1	1	1
Non-Labor	Zero-Based	11	11	87	0	0	0	11	11	87
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**12**	**12**	**88**	**0**	**0**	**0**	**12**	**12**	**88**
FTE	Zero-Based	0.1	0.1	0.8	0.0	0.0	0.0	0.1	0.1	0.8

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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00313.0
Category: C. GAS TRANSMISSION FREEWAY RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION FREEWAY RELOCATIONS
Workpaper Group: 003130 - GT PL Reloc-Fway / Externally Driven

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	5	8	3
Non-Labor	13	0	0	-234	0
NSE	0	0	0	0	0
Total	**13**	**0**	**5**	**-226**	**4**
FTE	0.0	0.0	0.0	0.1	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	234	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**234**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	5	8	3
Non-Labor	13	0	0	0	0
NSE	0	0	0	0	0
Total	**13**	**0**	**5**	**8**	**4**
FTE	0.0	0.0	0.0	0.1	0.0
Vacation & Sick (Nominal $)					
Labor	0	0	1	1	1
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**1**	**1**	**1**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
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	6	9	4
Non-Labor	13	0	0	0	0
NSE	0	0	0	0	0
Total	**13**	**0**	**6**	**9**	**4**
FTE	0.0	0.0	0.0	0.1	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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00313.0
Category: C. GAS TRANSMISSION FREEWAY RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION FREEWAY RELOCATIONS
Workpaper Group: 003130 - GT PL Reloc-Fway / 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	234	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**234**	**0**
FTE	0.0	0.0	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 Total		0	0	0	0	0.0	
2014 Total		0	0	0	0	0.0	
2015	Other	0	234	0	234	0.0	MGONZALX20170227142837830
Explanation:	Adjustment to remove the credit from a collectible work order in 2015.						
2015 Total		0	234	0	234	0.0	
2016 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 003130

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00313.0
Category: C. GAS TRANSMISSION FREEWAY RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION FREEWAY RELOCATIONS
Workpaper Group: 003130 - GT PL Reloc-Fway / Externally Driven
Workpaper Detail: 003130.001 - Blanket WOA

In-Service Date: Not Applicable

Description:

Relocate and replace pipelines and related facilities found to be in conflict with the widening of State Highway 71.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1	1	1
Non-Labor	11	11	87
NSE	0	0	0
Total	**12**	**12**	**88**
FTE	0.1	0.1	0.8

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: D. GAS TRANSMISSION RELOCATIONS
Workpaper: 003040

Summary for Category: D. GAS TRANSMISSION RELOCATIONS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	677	1,085	980	546
Non-Labor	3,538	10,499	9,484	5,288
NSE	0	0	0	0
Total	**4,215**	**11,584**	**10,464**	**5,834**
FTE	6.4	10.7	9.7	5.4

003040 GT - Pipeline Relocations - Franchise/Private

Labor	677	1,085	980	546
Non-Labor	3,538	10,499	9,484	5,288
NSE	0	0	0	0
Total	**4,215**	**11,584**	**10,464**	**5,834**
FTE	6.4	10.7	9.7	5.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
003040 - GT - Pipeline Relocations - Franchise/Private

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	5-YR Average	361	444	1,051	199	677	1,085	980	546
Non-Labor	5-YR Average	4,874	1,835	14,218	1,976	3,538	10,499	9,484	5,288
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**5,235**	**2,279**	**15,270**	**2,175**	**4,214**	**11,584**	**10,464**	**5,834**
FTE	5-YR Average	3.6	4.7	10.3	2.0	6.4	10.7	9.7	5.4

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 improvements projects, and other work required due to right-of-way agreements, contract and franchise requirements.

Physical Description:

Relocating pipe.

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 language. Collectability in these types of relocations rests wholly in the subject of the pipelines' prior rights.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00304.0
Category:	D. GAS TRANSMISSION RELOCATIONS
Category-Sub:	1. GAS TRANSMISSION RELOCATIONS
Workpaper Group:	003040 - GT - Pipeline Relocations - Franchise/Private

Forecast Methodology:

Labor - 5-YR Average

Labor content is based on the 5 years of recorded experience in this budget code.

Non-Labor - 5-YR Average

Non-labor costs are typically for materials, construction equipement, contract labor and paving repaid. Such costs are estimated by using historical spend.

NSE - 5-YR Average

None. These are pipeline construction projects.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private

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	546	546	546	539	434	0	1,085	980	546
Non-Labor	5-YR Average	5,288	5,288	5,288	5,211	4,196	0	10,499	9,484	5,288
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**5,834**	**5,834**	**5,834**	**5,750**	**4,630**	**0**	**11,584**	**10,464**	**5,834**
FTE	5-YR Average	5.4	5.4	5.4	5.3	4.3	0.0	10.7	9.7	5.4

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	539	5,211	0	5,750	5.3	KMMURIL120161130110655587
Explanation:	Based to meet anticipated future needs based upon increased activity						
2017 Total		539	5,211	0	5,750	5.3	
2018	Other	434	4,196	0	4,630	4.3	KMMURIL120161119110414757
Explanation:	To meet anticipated future needs based upon increased activity and cost assumptions						
2018 Total		434	4,196	0	4,630	4.3	
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	316	385	924	172	581
Non-Labor	4,956	1,855	14,530	1,991	3,538
NSE	0	0	0	0	0
Total	**5,272**	**2,239**	**15,453**	**2,163**	**4,119**
FTE	3.1	4.0	8.8	1.7	5.5
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	316	385	924	172	581
Non-Labor	4,956	1,855	14,530	1,991	3,538
NSE	0	0	0	0	0
Total	**5,272**	**2,239**	**15,453**	**2,163**	**4,119**
FTE	3.1	4.0	8.8	1.7	5.5
Vacation & Sick (Nominal $)					
Labor	51	64	151	28	96
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**51**	**64**	**151**	**28**	**96**
FTE	0.5	0.7	1.5	0.3	0.9
Escalation to 2016$					
Labor	-6	-5	-23	-2	0
Non-Labor	-82	-20	-311	-15	0
NSE	0	0	0	0	0
Total	**-88**	**-25**	**-334**	**-17**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	361	444	1,051	199	677
Non-Labor	4,874	1,835	14,218	1,976	3,538
NSE	0	0	0	0	0
Total	**5,235**	**2,279**	**15,270**	**2,175**	**4,214**
FTE	3.6	4.7	10.3	2.0	6.4

* 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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private

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

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 003040

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00304.0
Category:	D. GAS TRANSMISSION RELOCATIONS
Category-Sub:	1. GAS TRANSMISSION RELOCATIONS
Workpaper Group:	003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail:	003040.001 - L2001 Fullerton Road Grade Separation
In-Service Date:	11/30/2017

Description:

Relocation of high pressure steel pipeline to accommodate the proposed Alameda Corridor East-Construction Authority grade separation project at Fullerton Road and the UPRR crossing in the City of Industry. This grade separation project will promote public safety and improve rail transportation for the Port of Los Angeles. The Fullerton Road Grade Separation project is a franchise project with in the City of Industry and as such SoCalGas is required to relocate the pipeline.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	304	0	0
Non-Labor	2,946	0	0
NSE	0	0	0
Total	**3,250**	**0**	**0**
FTE	3.0	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.002 - PF 325-15-2003 3007 Metro Conflict 2 LAX

In-Service Date: 05/31/2018

Description:

Relocation of two pipelines, approximatelly 800 ft each, due to construction of Metro's new station platform. Relocation was requested by Metro.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	187	234	0
Non-Labor	1,813	2,266	0
NSE	0	0	0
Total	**2,000**	**2,500**	**0**
FTE	1.9	2.3	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.003 - L1004 Cabrillo Pavilion Relocation Project

In-Service Date: 04/30/2017

Description:

Approximately 832 feet of pipeline will be relocated to accommodate improvements planned by the City of Santa Barbara. The existing pipeline is in conflict with the proposed City plans and will be moved on to E Cabrillo Blvd.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	140	0	0
Non-Labor	1,360	0	0
NSE	0	0	0
Total	**1,500**	**0**	**0**
FTE	1.4	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.004 - L103 Pipe Supports at Inergy Facility Tupman Road

In-Service Date: 01/31/2018

Description:

Bridge replacement project due to aging infrastructure with existing water and oil lines. Approximately 5000-feet of pipeline will be abandoned and removed.

Forecast In 2016 $(000)			
Years	2017	2018	2019
Labor	70	70	0
Non-Labor	680	680	0
NSE	0	0	0
Total	**750**	**750**	**0**
FTE	0.7	0.7	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.005 - L2000 Meridian West Development - Riverside

In-Service Date: 11/30/2017

Description:

Relocation of approximately 1000ft of pipeline to accommodating a new mixed-use development near March Air Reserve Base.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	70	0	0
Non-Labor	680	0	0
NSE	0	0	0
Total	**750**	**0**	**0**
FTE	0.7	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.006 - Farmland Relocations

In-Service Date: Not Applicable

Description:

Based on recent experience there will be continued need to relocate Transmission pipeline segments because the shallow depth under fields used for agriculture make the pipelines vulnerable to significant damage by plows and/or other implements.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	47	47	47
Non-Labor	453	453	453
NSE	0	0	0
Total	**500**	**500**	**500**
FTE	0.5	0.5	0.5

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.007 - L765 Port of Long Beach Pier B Project

In-Service Date: 10/31/2019

Description:

Pipeline relocation at two locations due to conflict with a new rail road adjacent to the Port of Long Beach.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	47	94	47
Non-Labor	453	906	453
NSE	0	0	0
Total	**500**	**1,000**	**500**
FTE	0.5	0.9	0.5

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.009 - L324 Relocate 34 Line Westridge Parkway VA

In-Service Date: 06/30/2018

Description:

Relocate pipeline in the City of Valencia to accommodate the proposed extension of planned development. The existing pipeline is located within an easement that contains a relocation clause. The planned development requires the developer to excavate 25-feet below the existing grade, prior to compacting and filling 45-feet above the existing location of the gas pipeline. The development will require the pipeline to be relocated in a new alignment to accommodate the planned development

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	33	64	0
Non-Labor	317	614	0
NSE	0	0	0
Total	**350**	**678**	**0**
FTE	0.3	0.6	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.010 - Fairway Drive Grade Separation L2001

In-Service Date: 08/31/2018

Description:

Relocation of high pressure steel pipeline to accommodate the proposed Alameda Corridor East-Construction Authority grade separation project at Fairway Drive and the UPRR crossing in the City of Industry. This grade separation project will be for public safety and improve rail transportation for the Port of Los Angeles. The Fairway Grade Grade Separation project is not a franchise project within the County of Los Angeles and as such the Southern California Gas Company has an agreement with the Alameda Corridor East- Construction Authority for 80% reimbursement.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	2	95	0
Non-Labor	22	920	0
NSE	0	0	0
Total	**24**	**1,015**	**0**
FTE	0.1	0.9	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00304.0
Category:	D. GAS TRANSMISSION RELOCATIONS
Category-Sub:	1. GAS TRANSMISSION RELOCATIONS
Workpaper Group:	003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail:	003040.011 - Line 1176 Ballona Wetlands Restoration Project
In-Service Date:	11/30/2018

Description:

Pipeline runs through the Ballona Wetlands Ecological Reserve. The Reserve is going to be restored and redeveloped. The pipe location is under an area that will start to hold the ocean water at high tide. Relocation of the pipeline will accomodate the Ballona Wetlands restoration.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	281	0
Non-Labor	0	2,719	0
NSE	0	0	0
Total	**0**	**3,000**	**0**
FTE	0.0	2.8	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.012 - L225 Northlake Development

In-Service Date: 02/28/2019

Description:

Pipeline relocation due to conflict with new development.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	23	23	23
Non-Labor	227	227	227
NSE	0	0	0
Total	**250**	**250**	**250**
FTE	0.2	0.2	0.2

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.013 - PF 179-16-2003 3007 LAWA - LAX

In-Service Date: 01/31/2018

Description:

Relocation of of two pipeline, approximately 800 feet each, due to conflict with street improvement work by Los Angeles World Airport (LAWA). Work is requested by LAWA.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	94	47	0
Non-Labor	906	453	0
NSE	0	0	0
Total	**1,000**	**500**	**0**
FTE	0.9	0.5	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00304.0
Category: D. GAS TRANSMISSION RELOCATIONS
Category-Sub: 1. GAS TRANSMISSION RELOCATIONS
Workpaper Group: 003040 - GT - Pipeline Relocations - Franchise/Private
Workpaper Detail: 003040.014 - Blanket WOA

In-Service Date: Not Applicable

Description:

Blanket WOA for costs associated with the modification and relocation of transmission pipelines to accomodate right-of-way agreements, contract and franchise requirements.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	68	25	429
Non-Labor	642	246	4,155
NSE	0	0	0
Total	**710**	**271**	**4,584**
FTE	0.5	0.3	4.2

Note: Totals may include rounding differences.

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

Summary for Category: E. GAS TRANSMISSION COMPRESSOR STATIONS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	786	942	1,378	894
Non-Labor	6,645	12,352	17,973	11,732
NSE	0	0	0	0
Total	**7,431**	**13,294**	**19,351**	**12,626**
FTE	7.3	9.5	13.9	9.0
M03050 MP Comp Sta Add/Rpls/Pre 2004				
Labor	0	4	4	4
Non-Labor	12	189	189	189
NSE	0	0	0	0
Total	**12**	**193**	**193**	**193**
FTE	0.0	0.1	0.1	0.1
M03150 MP Comp Sta Add/Rpls / Externally Driven				
Labor	758	850	1,286	802
Non-Labor	5,830	10,968	16,589	10,348
NSE	0	0	0	0
Total	**6,588**	**11,818**	**17,875**	**11,150**
FTE	7.1	8.7	13.1	8.2
M03250 MP Comp Sta Add/Rpls / Volume Driven				
Labor	28	88	88	88
Non-Labor	803	1,195	1,195	1,195
NSE	0	0	0	0
Total	**831**	**1,283**	**1,283**	**1,283**
FTE	0.2	0.7	0.7	0.7

Note: Totals may include rounding differences.

Beginning of Workpaper Group
M03050 - MP Comp Sta Add/Rpls/Pre 2004

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0305.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03050 - MP Comp Sta Add/Rpls/Pre 2004

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	5-YR Average	7	3	12	1	0	4	4	4
Non-Labor	5-YR Average	267	136	520	11	12	189	189	189
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**274**	**138**	**532**	**11**	**12**	**193**	**193**	**193**
FTE	5-YR Average	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1

Business Purpose:

This Budget Code includes costs associated with the installation and replacement of compressor station equipment used in operating the transmission system. The nature of compressor station operation requires consistent maintenance and replacement of key engine components and controls equipment to sustain the reliability and safety of the facility. To keep operating costs down, reliance is made on automating data gathering systems to monitor performance data such as flows,pressures, and temperatures. The upgrade and replacement of controls consisting of out dated technology is critical to enable the station to operate at its highest efficiency. 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: replacing the pneumatic and electro-mechanical control systems and related station auxiliary systems, installation of new engine control panels, new station control panel and replacement of sensors, wiring, industrial communications and local controllers. New Programmable Logic Controllers, local control networks, operator interfaces, continuous emissions monitoring (CEMS), precombustion chambers, and new catalysts.

Project Justification:

This request is for the 5-year average of recorded project costs in years 2012-16. There will always be capital project work needed for compressor stations in the years to come as these critical facilities continue to age and to accumulate operating hours. This is routine work to sustain continuing operations.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0305.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03050 - MP Comp Sta Add/Rpls/Pre 2004

Forecast Methodology:

Labor - 5-YR Average

The labor portion of this estimate was calculated using the average labor contained in the most recent five years of recorded activity in this budget code.

Non-Labor - 5-YR Average

Non-labor costs are typically for materials, construction equipment, contract labor and paving repair, if any. Such costs are estimated by experienced pipeline construction management personnel using reference to recent Compressor Station construction projects of similar scope, equipment type, and construction environment.

NSE - 5-YR Average

None. Compressor stations are Gas Transmission capital assets that are pipeline-related.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0305.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03050 - MP Comp Sta Add/Rpls/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	5-YR Average	4	4	4	0	0	0	4	4	4
Non-Labor	5-YR Average	189	189	189	0	0	0	189	189	189
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**193**	**193**	**193**	**0**	**0**	**0**	**193**	**193**	**193**
FTE	5-YR Average	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	0	0	0	0	0.1	KMMURIL120161204091720993
Explanation:	Based on historical.						
2017 Total		0	0	0	0	0.1	
2018	Other	0	0	0	0	0.1	KMMURIL120161204091737113
Explanation:	Based on historical						
2018 Total		0	0	0	0	0.1	
2019	Other	0	0	0	0	0.1	KMMURIL120161204091748300
Explanation:	Based on historical.						
2019 Total		0	0	0	0	0.1	

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0305.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03050 - MP Comp Sta Add/Rpls/Pre 2004

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	6	2	10	1	0
Non-Labor	271	137	531	11	0
NSE	0	0	0	0	0
Total	**278**	**140**	**541**	**11**	**0**
FTE	0.1	0.0	0.1	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	12
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**12**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	6	2	10	1	0
Non-Labor	271	137	531	11	12
NSE	0	0	0	0	0
Total	**278**	**140**	**541**	**11**	**12**
FTE	0.1	0.0	0.1	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	1	0	2	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**1**	**0**	**2**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	-4	-1	-11	0	0
NSE	0	0	0	0	0
Total	**-5**	**-1**	**-12**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	7	3	12	1	0
Non-Labor	267	136	520	11	12
NSE	0	0	0	0	0
Total	**274**	**138**	**532**	**11**	**12**
FTE	0.1	0.0	0.1	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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0305.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03050 - MP Comp Sta Add/Rpls/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	12
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**12**
FTE	0.0	0.0	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 Total		0	0	0	0	0.0	
2014 Total		0	0	0	0	0.0	
2015 Total		0	0	0	0	0.0	
2016	Other	0	12	0	12	0.0	KMMURIL120170215115813190
Explanation:	Moved costs from GT witness area.						
2016 Total		0	12	0	12	0.0	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group M03050

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0305.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03050 - MP Comp Sta Add/Rpls/Pre 2004
Workpaper Detail: M03050.001 - Blanket WOA

In-Service Date: Not Applicable

Description:

Blanket work order which includes costs for miscellaneous capital work for compressors.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	4	4	4
Non-Labor	189	189	189
NSE	0	0	0
Total	**193**	**193**	**193**
FTE	0.1	0.1	0.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
M03150 - MP Comp Sta Add/Rpls / Externally Driven

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0315.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03150 - MP Comp Sta Add/Rpls / Externally Driven

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	565	551	497	770	758	850	1,286	802
Non-Labor	Zero-Based	7,836	5,200	5,744	7,958	5,830	10,968	16,589	10,348
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**8,401**	**5,751**	**6,241**	**8,728**	**6,587**	**11,818**	**17,875**	**11,150**
FTE	Zero-Based	6.2	5.5	4.9	7.6	7.1	8.7	13.1	8.2

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.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven

Forecast Methodology:

Labor - Zero-Based

The estimate was prepared by personnel experienced in this type of work and with reference to recent projects of similar scopet.

Non-Labor - Zero-Based

Non-labor costs for this project consist of contracted labor and equipment, and materials. 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

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0315.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03150 - MP Comp Sta Add/Rpls / 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	850	1,286	802	0	0	0	850	1,286	802
Non-Labor	Zero-Based	10,968	16,589	10,348	0	0	0	10,968	16,589	10,348
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**11,818**	**17,875**	**11,150**	**0**	**0**	**0**	**11,818**	**17,875**	**11,150**
FTE	Zero-Based	8.7	13.1	8.2	0.0	0.0	0.0	8.7	13.1	8.2

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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0315.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03150 - MP Comp Sta Add/Rpls / Externally Driven

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	495	477	436	668	651
Non-Labor	7,968	5,256	5,870	8,018	5,830
NSE	0	0	0	0	0
Total	**8,463**	**5,733**	**6,306**	**8,686**	**6,480**
FTE	5.3	4.7	4.2	6.5	6.1
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	495	477	436	668	651
Non-Labor	7,968	5,256	5,870	8,018	5,830
NSE	0	0	0	0	0
Total	**8,463**	**5,733**	**6,306**	**8,686**	**6,480**
FTE	5.3	4.7	4.2	6.5	6.1
Vacation & Sick (Nominal $)					
Labor	79	79	71	108	107
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**79**	**79**	**71**	**108**	**107**
FTE	0.9	0.8	0.7	1.1	1.0
Escalation to 2016$					
Labor	-9	-6	-11	-6	0
Non-Labor	-132	-56	-126	-60	0
NSE	0	0	0	0	0
Total	**-141**	**-62**	**-137**	**-66**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	565	551	497	770	758
Non-Labor	7,836	5,200	5,744	7,958	5,830
NSE	0	0	0	0	0
Total	**8,401**	**5,751**	**6,241**	**8,728**	**6,587**
FTE	6.2	5.5	4.9	7.6	7.1

* 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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0315.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03150 - MP Comp Sta Add/Rpls / 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

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group M03150

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail:	M03150.001 - Rule 1160 Upgrades
In-Service Date:	Not Applicable

Description:

Replacement and upgrade of equipment (i.e. AFRC ePCC turbochargers, cooling mods, etc) to limit emissions associated with emergency, portable, standby, or stationary internal combustion engines in the Mojave Air District which includes North Needles, South Needles, Blythe, Adelanto, Kelso, and Newberry Compressor Stations. Rule 1160 is applicable to any stationary internal combustion engine rated at 500 or more brake horsepower.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	252	252	0
Non-Labor	3,248	3,248	0
NSE	0	0	0
Total	**3,500**	**3,500**	**0**
FTE	2.6	2.6	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail:	M03150.002 - Catalyst Housing and SCR CO catalyst - Wheeler Ridge
In-Service Date:	11/30/2017

Description:

Catalyst Bed for T-401 is againg and in need of replacement . Cannot replace catalyst bed since housing is warped and damaged. There have been updates in technology since the system was first designed. Redesign selective Catalytic Reduction System for entire station and install new ammonia injection gird, catalyst bed, and housing for T-401. Other units will be replaced as necessary in the future.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	216	0	0
Non-Labor	2,784	0	0
NSE	0	0	0
Total	**3,000**	**0**	**0**
FTE	2.2	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0315.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail: M03150.003 - Water line to plant - South Needles

In-Service Date: 11/30/2017

Description:

The water line to the plant is an 8 inch diameter transite-lined steel pipeline of approximately 11 miles that runs from the Needles golf course, adjacent to the Colorado River, to the station. The line was installed in 1957 and is under cathodic protection. However, due to the age of the pipe, replacement is recommended. The water line provides all the cooling required to run the units.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	108	0	0
Non-Labor	1,392	0	0
NSE	0	0	0
Total	**1,500**	**0**	**0**
FTE	1.1	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail:	M03150.004 - Newberry Springs Replacement of Auxiliary Tower Air Washers
In-Service Date:	11/30/2017

Description:

Replacement of14 auxiliary cooling tower air washers two per cooling tower on seven towers.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	79	0	0
Non-Labor	1,021	0	0
NSE	0	0	0
Total	**1,100**	**0**	**0**
FTE	0.8	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail:	M03150.005 - New water lines and water tank - Newberry Springs
In-Service Date:	11/30/2017

Description:

Replacement of on site water lines and water tank at Newberry Springs compressor station. All on site water piping to be replaced including supply to onsite domestic water supply, gas and auxiliary water cooling, glycol tank, and water suppression system.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	79	0	0
Non-Labor	1,021	0	0
NSE	0	0	0
Total	**1,100**	**0**	**0**
FTE	0.8	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail:	M03150.006 - North Needle Install 3 Check Valve
In-Service Date:	12/31/2018

Description:

Engineering design and installation of check valves in discharge lines of units 1, 2,and 3 at North Needle Compressor Station. The installation of check valves will facilitate the bumpless switch of the main units while preventing backflow through the unit bypass valves at high station different pressures.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	57	0
Non-Labor	0	733	0
NSE	0	0	0
Total	**0**	**790**	**0**
FTE	0.0	0.6	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0315.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail: M03150.007 - Newberry Springs Castone Generator Overhaul and Catalyst Replacement

In-Service Date: Not Applicable

Description:

The Capstone generators require an annual overhaul and catalyst replacement in order maintain emission control standards.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	22	22	22
Non-Labor	278	278	278
NSE	0	0	0
Total	**300**	**300**	**300**
FTE	0.2	0.2	0.2

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail:	M03150.008 - Gas Transmission Compressor Station Additions/Replacements/Externally Driven
In-Service Date:	Not Applicable

Description:

This budget codes includes costs for a blanket work order associated with the installation and replacement of compressor station equipment that support the reliable operation of the gas transmission system. The nature of compressor station operation requires consistent maintenance and replacement of key engine components and controls equipment to sustain the reliability, resiliency, and safety of the facility.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	360	576
Non-Labor	0	4,640	7,424
NSE	0	0	0
Total	**0**	**5,000**	**8,000**
FTE	0.0	3.7	5.9

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail:	M03150.009 - Compressor Station Ranking (Bulk under 250k)
In-Service Date:	Not Applicable

Description:

Ask Rick/team

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	47	47
Non-Labor	0	603	603
NSE	0	0	0
Total	**0**	**650**	**650**
FTE	0.0	0.5	0.5

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail:	M03150.010 - Blythe Station - Cooling Tower Upgrades
In-Service Date:	11/30/2018

Description:

The cooling towers at Blythe have multiple heat exchanger bundles/bays adjacent to each other within the tower. With this design there is always the possibility of drawing ambient (outside) non-precooled air from the fan that is not operating into the suction path of the one that is operating. This creates varying air flow conditions and inefficient cooling overall cooling. Upgrade/Replacement is required for more efficient cooling.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	108	0
Non-Labor	0	1,392	0
NSE	0	0	0
Total	**0**	**1,500**	**0**
FTE	0.0	1.1	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0315.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail: M03150.011 - Replace buried station bypass valve - Newberry Springs

In-Service Date: 11/30/2019

Description:

Replacement of four 30 inch station by-pass valves that are half buried in the ground. These valves will be replaced with a modulating design.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	108
Non-Labor	0	0	1,392
NSE	0	0	0
Total	**0**	**0**	**1,500**
FTE	0.0	0.0	1.1

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0315.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail: M03150.012 - Blanket WOA

In-Service Date: Not Applicable

Description:

Blanker Work Order used to capture the costs of multiple capital projects that we expect to complete during the forecast period.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	94	338	49
Non-Labor	1,224	4,367	651
NSE	0	0	0
Total	**1,318**	**4,705**	**700**
FTE	1.0	3.4	0.5

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0315.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03150 - MP Comp Sta Add/Rpls / Externally Driven
Workpaper Detail:	M03150.013 - Wheeler Ridge Filter Separator V-101
In-Service Date:	05/31/2018

Description:

Replacement of filter separator is required for proper filtration of liquids. Current Filter medium is intended for larger amounts of dry particle substance and is inadequate for the large quantities of liquids the Wheeler Ridge station encounters.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	102	0
Non-Labor	0	1,328	0
NSE	0	0	0
Total	**0**	**1,430**	**0**
FTE	0.0	1.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
M03250 - MP Comp Sta Add/Rpls / Volume Driven

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0325.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03250 - MP Comp Sta Add/Rpls / Volume Driven

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	5-YR Average	29	1	11	370	28	88	88	88
Non-Labor	5-YR Average	138	0	196	4,843	803	1,195	1,195	1,195
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**167**	**1**	**207**	**5,213**	**831**	**1,283**	**1,283**	**1,283**
FTE	5-YR Average	0.2	0.0	0.1	3.0	0.2	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 nature of compressor station operation requires consistent maintenance and replacement of key engine components and controls equipment to sustain the reliability and safety of the facility.

Physical Description:

This work paper represents multiple smaller projects not qualifying for their own work paper and is based on recent experience in maintaining compressor-related equipment through capital component replacements and upgrades.

Project Justification:

Compressor engine components have a finite life requiring regular replacement and/or upgrade as recommended by the manufacturer.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0325.0
Category:	E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03250 - MP Comp Sta Add/Rpls / Volume Driven

Forecast Methodology:

Labor - 5-YR Average

Labor forecast is based on the 5 years of recorded costs in this budget code.

Non-Labor - 5-YR Average

Non-labor costs are typically for materials, construction equipement, and contract labor. Such costs are estimated by using historical spend.

NSE - 5-YR Average

None.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0325.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03250 - MP Comp Sta Add/Rpls / Volume 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	87	87	87	1	1	1	88	88	88
Non-Labor	5-YR Average	1,196	1,196	1,196	-1	-1	-1	1,195	1,195	1,195
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**1,283**	**1,283**	**1,283**	**0**	**0**	**0**	**1,283**	**1,283**	**1,283**
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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0325.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03250 - MP Comp Sta Add/Rpls / Volume Driven

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	26	1	9	321	24
Non-Labor	140	0	201	4,880	803
NSE	0	0	0	0	0
Total	**166**	**1**	**210**	**5,201**	**827**
FTE	0.2	0.0	0.1	2.6	0.2
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	26	1	9	321	24
Non-Labor	140	0	201	4,880	803
NSE	0	0	0	0	0
Total	**166**	**1**	**210**	**5,201**	**827**
FTE	0.2	0.0	0.1	2.6	0.2
Vacation & Sick (Nominal $)					
Labor	4	0	2	52	4
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**4**	**0**	**2**	**52**	**4**
FTE	0.0	0.0	0.0	0.4	0.0
Escalation to 2016$					
Labor	0	0	0	-3	0
Non-Labor	-2	0	-4	-37	0
NSE	0	0	0	0	0
Total	**-3**	**0**	**-5**	**-40**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	29	1	11	370	28
Non-Labor	138	0	196	4,843	803
NSE	0	0	0	0	0
Total	**167**	**1**	**207**	**5,213**	**831**
FTE	0.2	0.0	0.1	3.0	0.2

* 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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0325.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03250 - MP Comp Sta Add/Rpls / Volume 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

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group M03250

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0325.0
Category: E. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03250 - MP Comp Sta Add/Rpls / Volume Driven
Workpaper Detail: M03250.001 - Blanket WOA

In-Service Date: Not Applicable

Description:

The Multiple Smaller Projects Blanket Work Order is used to capture the costs of multiple capital projects that we expect to complete during the forecast period.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	88	88	88
Non-Labor	1,195	1,195	1,195
NSE	0	0	0
Total	**1,283**	**1,283**	**1,283**
FTE	0.7	0.7	0.7

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: F. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper: M03350

Summary for Category: F. GAS TRANSMISSION COMPRESSOR STATIONS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	917	1,628	5,040	5,100
Non-Labor	10,715	35,510	78,960	98,900
NSE	0	0	0	0
Total	**11,632**	**37,138**	**84,000**	**104,000**
FTE	8.8	38.2	48.9	68.8

M03350 MP Comp Sta Add/Rpls / Quality/Economic Driven

Labor	917	1,628	5,040	5,100
Non-Labor	10,715	35,510	78,960	98,900
NSE	0	0	0	0
Total	**11,632**	**37,138**	**84,000**	**104,000**
FTE	8.8	38.2	48.9	68.8

Note: Totals may include rounding differences.

Beginning of Workpaper Group
M03350 - MP Comp Sta Add/Rpls / Quality/Economic Driven

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0335.0
Category: F. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03350 - MP Comp Sta Add/Rpls / Quality/Economic Driven

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	5-YR Average	82	67	84	360	917	1,628	5,040	5,100
Non-Labor	5-YR Average	289	261	386	3,586	10,715	35,510	78,960	98,900
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**371**	**328**	**470**	**3,946**	**11,631**	**37,138**	**84,000**	**104,000**
FTE	5-YR Average	0.9	0.7	0.8	3.4	8.8	38.2	48.9	68.8

Business Purpose:

The availability and reliability of SoCalGas' nine compressor stations are at the core of the Company's operational success. SoCalGas is confronted with the reality that many of these compressor stations and sub-systems were placed in service over 50 years ago, with some placed in service almost 70 years ago. SoCalGas historically has managed its compressor stations reliably through targeted capital upgrades and vigilant maintenance programs.

Physical Description:

SoCalGas will decommission two compressor stations, Desert Center and Cactus City, and isolate the station from existing transmission pipelines.SoCalGas will install new gas compression and related ancillary systems at the Blythe Compressor Station.

Project Justification:

The installation of these new compressors will allow SoCalGas to continue to meet the current design specification and capacity of 1.2 BCF per day while retiring three 1940s vintage compressors and relegating two Caterpillar engine-driven compressors to standby service until they can be replaced. Upon completion, the Blythe Compressor Replacement project will provide the necessary operational reliability and resiliency to support SoCalGas' transmission system's operational needs while resulting in the reduction of criteria air pollutants such as oxides of nitrogen, greenhouse gases, particulate matter, and fugitive methane emissions through the installation of select catalytic reduction and other applied technologies.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0335.0
Category:	F. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03350 - MP Comp Sta Add/Rpls / Quality/Economic Driven

Forecast Methodology:

Labor - 5-YR Average

This forecast method uses the 5-year average that was derived from zero based estimates from detailed engineering analysis.

Non-Labor - 5-YR Average

This forecast method uses the 5-year average that was derived from zero based estimates from detailed engineering analysis.

NSE - 5-YR Average

None.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0335.0
Category: F. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03350 - MP Comp Sta Add/Rpls / Quality/Economic 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	301	301	301	1,327	4,739	4,799	1,628	5,040	5,100
Non-Labor	5-YR Average	3,047	3,047	3,047	32,463	75,913	95,853	35,510	78,960	98,900
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**3,348**	**3,348**	**3,348**	**33,790**	**80,652**	**100,652**	**37,138**	**84,000**	**104,000**
FTE	5-YR Average	2.9	2.9	2.9	35.3	46.0	65.9	38.2	48.9	68.8

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	1,326	32,463	0	33,789	35.3	KMMURIL120170306130701277
Explanation:	Blythe compressor replacement project.						
2017 Total		1,326	32,463	0	33,789	35.3	
2018	Other	4,738	75,913	0	80,651	46.0	KMMURIL120170306125202783
Explanation:	Blythe project(s).						
2018 Total		4,738	75,913	0	80,651	46.0	
2019	Other	4,798	95,853	0	100,651	65.9	KMMURIL120170306130942290
Explanation:	Blythe project(s).						
2019 Total		4,798	95,853	0	100,651	65.9	

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0335.0
Category: F. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03350 - MP Comp Sta Add/Rpls / Quality/Economic Driven

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	72	58	74	312	787
Non-Labor	294	264	395	3,613	10,715
NSE	0	0	0	0	0
Total	**365**	**322**	**468**	**3,926**	**11,502**
FTE	0.7	0.6	0.7	2.9	7.5
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	72	58	74	312	787
Non-Labor	294	264	395	3,613	10,715
NSE	0	0	0	0	0
Total	**365**	**322**	**468**	**3,926**	**11,502**
FTE	0.7	0.6	0.7	2.9	7.5
Vacation & Sick (Nominal $)					
Labor	12	10	12	51	130
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**12**	**10**	**12**	**51**	**130**
FTE	0.1	0.1	0.1	0.5	1.3
Escalation to 2016$					
Labor	-1	-1	-2	-3	0
Non-Labor	-5	-3	-8	-27	0
NSE	0	0	0	0	0
Total	**-6**	**-4**	**-10**	**-30**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	82	67	84	360	917
Non-Labor	289	261	386	3,586	10,715
NSE	0	0	0	0	0
Total	**371**	**328**	**470**	**3,946**	**11,631**
FTE	0.8	0.7	0.8	3.4	8.8

* 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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0335.0
Category: F. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03350 - MP Comp Sta Add/Rpls / Quality/Economic 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

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group M03350

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0335.0
Category:	F. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03350 - MP Comp Sta Add/Rpls / Quality/Economic Driven
Workpaper Detail:	M03350.001 - Cactus City Phase 1 Decom Pipe Isolation
In-Service Date:	08/31/2017

Description:

Physical isolation of station from all inlet and outlet gas piping and electrical power. Install new pedestal power drop and station panel, abandon and remove existing pole mounted power drop and panel. Replace CP rectifier, structural and anode wire. To be followed by demo and removal of station assets to include building, compressor, all auxiliary equipment/plant assets

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	94	0	0
Non-Labor	1,475	0	0
NSE	0	0	0
Total	**1,569**	**0**	**0**
FTE	0.9	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: M0335.0
Category: F. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub: 1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group: M03350 - MP Comp Sta Add/Rpls / Quality/Economic Driven
Workpaper Detail: M03350.002 - Desert Center Phase 1 Decom Pipe Isolation

In-Service Date: 08/31/2017

Description:

Physical isolation of station from all inlet and outlet gas piping and electrical power. Install new pedestal power drop and station panel, abandon and remove existing pole mounted power drop and panel. Replace CP rectifier, structural and anode wire. To be followed by demo and removal of station assets to include building, compressor, all auxiliary equipment/plant assets.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	94	0	0
Non-Labor	1,475	0	0
NSE	0	0	0
Total	**1,569**	**0**	**0**
FTE	0.9	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0335.0
Category:	F. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03350 - MP Comp Sta Add/Rpls / Quality/Economic Driven
Workpaper Detail:	M03350.004 - Blythe Compressor Project Phase 1
In-Service Date:	08/31/2019

Description:

To accommodate the new compressors while maintaining operations at the Blythe Compressor Station, a new compressor building will be constructed within the existing property boundary. Appurtenances including compressor pipe manifolds, electric generators and cabling related switch gear, control systems, panel and wiring will be installed to support the new turbine-driven compressors. New gas and engine cooling systems are also part of the planned projects. SoCalGas will, as part of its strategic plan for the station, rebuild five Clark reciprocating compressors and outfit them with state-of-the-art clean-burn emission reduction technology. SoCalGas has identified two phases for this project. Phase 1 and Phase 2 will proceed concurrently. Splitting activities between Phase 1 and Phase 2 is for the purpose of capturing scope of work and capital assets that can be placed into service a few months prior to the commissioning of the total project. The capital assets that comprise Phase 1, the smaller capital budget, are anticipated to be placed into service in the end of August 2019. Generally, these elements include the new electric generators, cooling tower apparatus, underground and aboveground pipelines, and other infrastructure that will be used and useful in the existing operation of the Blythe Compressor Facility. Phase 2, the larger capital budget, generally includes the capital assets associated with the commissioning of the new turbine compressors associated with the new Plant 4.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1,440	600	0
Non-Labor	22,560	19,400	4,000
NSE	0	0	0
Total	**24,000**	**20,000**	**4,000**
FTE	36.4	5.8	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	M0335.0
Category:	F. GAS TRANSMISSION COMPRESSOR STATIONS
Category-Sub:	1. GAS TRANSMISSION COMPRESSOR STATIONS
Workpaper Group:	M03350 - MP Comp Sta Add/Rpls / Quality/Economic Driven
Workpaper Detail:	M03350.005 - Blythe Compressor Project Phase 2
In-Service Date:	11/30/2019

Description:

To accommodate the new compressors while maintaining operations at the Blythe Compressor Station, a new compressor building will be constructed within the existing property boundary. Appurtenances including compressor pipe manifolds, electric generators and cabling related switch gear, control systems, panel and wiring will be installed to support the new turbine-driven compressors. New gas and engine cooling systems are also part of the planned projects. SoCalGas will, as part of its strategic plan for the station, rebuild five Clark reciprocating compressors and outfit them with state-of-the-art clean-burn emission reduction technology. SoCalGas has identified two phases for this project. Phase 1 and Phase 2 will proceed concurrently. Splitting activities between Phase 1 and Phase 2 is for the purpose of capturing scope of work and capital assets that can be placed into service a few months prior to the commissioning of the total project. The capital assets that comprise Phase 1, the smaller capital budget, are anticipated to be placed into service in the end of August 2019. Generally, these elements include the new electric generators, cooling tower apparatus, underground and aboveground pipelines, and other infrastructure that will be used and useful in the existing operation of the Blythe Compressor Facility. Phase 2, the larger capital budget, generally includes the capital assets associated with the commissioning of the new turbine compressors associated with the new Plant 4.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	4,440	5,100
Non-Labor	10,000	59,560	94,900
NSE	0	0	0
Total	**10,000**	**64,000**	**100,000**
FTE	0.0	43.1	68.8

Note: Totals may include rounding differences.

Supplemental Workpapers for Workpaper Group M03350

Southern California Gas Company

2019 GRC – APP

Capital Workpapers

SCG-07-CWP-SUP-01
SoCalGas – Gas Transmission – Witnesses Michael A. Bermel and Beth Musich
Supplemental Workpaper Calculations for Ventura Compressor Station Replacement Activities
Compressor Replacement Workpaper

Forecasted Project Capital Investment
($ in thousands)

Description	Forecasted 2017	Forecasted 2018	Forecasted 2019
Labor	$561	$657	$1,305
Non-Labor	$7,241	$8,145	$14,497
Total	**$7,802**	**$8,802**	**$15,802**

Total projected capital investment 2017-2019 = $32,406

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

Description	Forecasted 2020	Forecasted 2021	Forecasted 2022
Labor	$3,407	$3,407	$0
Non-Labor	$47,409	$47,409	$0
Total	**$50,816**	**$50,816**	**$0**

Projected In-service Date: 12/31/2021

Description	2017-2021 Forecast	Project Total*
Labor	$9,337	$9,700
Non-Labor	$124,701	$128,600
Total	$134,038	$138,300

**Including 2016 Project Actuals = $4,262*

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

Project Description:

The Ventura Compressor Replacement Project (VCR) will ultimately consist of six compressor trains. Three of these compressor trains will be purchased new, engineered, and installed in a new building on the west side of the station grounds. Each new unit will be engine-driven with non-Selective Catalytic Reduction emissions reduction systems with 1680 horsepower each. Three existing Cooper-Superior Reciprocating compressors (1,100 HP each) will undergo extensive emissions testing to determine if the units can be utilized in the future configuration. This testing will also determine what type of emissions reduction equipment needs to be installed on the existing units to can meet the thresholds specified on the air permit. If the testing on the existing compressor engines determines that the emissions are too high to include in a new air permit after retrofit, then these units will be replaced

with 3 new units similar to the other 3 and installed in a new separate building located where the existing Cooper Superior units are currently housed.

The Ventura Replacement Project is essential to meeting the increasing demands of the coastal system by providing gas to customers directly as well as increasing the storage capacity of the Goleta Storage Field.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: G. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper: 003160

Summary for Category: G. GAS TRANSMISSION CATHODIC PROTECTION

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	399	500	623	665
Non-Labor	3,239	4,500	5,612	5,993
NSE	0	0	0	0
Total	**3,638**	**5,000**	**6,235**	**6,658**
FTE	4.1	6.8	7.7	7.4

003160 GT Cathodic Protection / Externally Driven

Labor	399	500	623	665
Non-Labor	3,239	4,500	5,612	5,993
NSE	0	0	0	0
Total	**3,638**	**5,000**	**6,235**	**6,658**
FTE	4.1	6.8	7.7	7.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
003160 - GT Cathodic Protection / Externally Driven

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00316.0
Category: G. GAS TRANSMISSION CATHODIC PROTECTION
Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper Group: 003160 - GT Cathodic Protection / Externally Driven

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Base YR Rec	56	149	200	213	399	500	623	665
Non-Labor	Base YR Rec	196	945	1,573	1,411	3,239	4,500	5,612	5,993
NSE	Base YR Rec	0	0	0	0	0	0	0	0
Total		**252**	**1,094**	**1,773**	**1,625**	**3,638**	**5,000**	**6,235**	**6,658**
FTE	Base YR Rec	0.6	1.6	2.2	2.1	4.1	6.8	7.7	7.4

Business Purpose:

This Budget Code includes costs associated with the installation of cathodic protection equipement used to preserve the integrity of transmission pipelines by protecting them from external corrosion. These projects are mandated by Federal and State pipelines safety regulations, and enable the maintenance of adequate 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 SoCalGas to meet Federal and State safety compliance requirements to sustain reliability of transportation into the Southern California market.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00316.0
Category:	G. GAS TRANSMISSION CATHODIC PROTECTION
Category-Sub:	1. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper Group:	003160 - GT Cathodic Protection / Externally Driven

Forecast Methodology:

Labor - Base YR Rec

Base year forecast selected because forward activity compliance exceeds our previous spend.

Non-Labor - Base YR Rec

Base year forecast used because Non-Labor based on hisorical ratio of non labor hisorical expenses in this category.

NSE - Base YR Rec

None. This work is pipeline-related.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00316.0
Category: G. GAS TRANSMISSION CATHODIC PROTECTION
Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper Group: 003160 - GT Cathodic Protection / 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	Base YR Rec	399	399	399	101	224	266	500	623	665
Non-Labor	Base YR Rec	3,238	3,238	3,238	1,262	2,374	2,755	4,500	5,612	5,993
NSE	Base YR Rec	0	0	0	0	0	0	0	0	0
Total		**3,637**	**3,637**	**3,637**	**1,363**	**2,598**	**3,021**	**5,000**	**6,235**	**6,658**
FTE	Base YR Rec	4.1	4.1	4.1	2.7	3.6	3.3	6.8	7.7	7.4

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	101	1,261	0	1,362	2.7	KMMURIL120161120083542427
Explanation:	Based on plan.						
2017 Total		101	1,261	0	1,362	2.7	
2018	Other	224	2,373	0	2,597	3.6	KMMURIL120161120083739520
Explanation:	Based on plan.						
2018 Total		224	2,373	0	2,597	3.6	
2019	Other	266	2,754	0	3,020	3.3	KMMURIL120161120084351443
Explanation:	Based on plan.						
2019 Total		266	2,754	0	3,020	3.3	

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00316.0
Category: G. GAS TRANSMISSION CATHODIC PROTECTION
Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper Group: 003160 - GT Cathodic Protection / Externally Driven

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	49	129	176	185	343
Non-Labor	200	955	1,608	1,422	3,239
NSE	0	0	0	0	0
Total	**249**	**1,085**	**1,783**	**1,607**	**3,581**
FTE	0.5	1.4	1.9	1.8	3.5
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	49	129	176	185	343
Non-Labor	200	955	1,608	1,422	3,239
NSE	0	0	0	0	0
Total	**249**	**1,085**	**1,783**	**1,607**	**3,581**
FTE	0.5	1.4	1.9	1.8	3.5
Vacation & Sick (Nominal $)					
Labor	8	21	29	30	56
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**8**	**21**	**29**	**30**	**56**
FTE	0.1	0.2	0.3	0.3	0.6
Escalation to 2016$					
Labor	-1	-2	-4	-2	0
Non-Labor	-3	-10	-34	-11	0
NSE	0	0	0	0	0
Total	**-4**	**-12**	**-39**	**-12**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	56	149	200	213	399
Non-Labor	196	945	1,573	1,411	3,239
NSE	0	0	0	0	0
Total	**252**	**1,094**	**1,773**	**1,625**	**3,638**
FTE	0.6	1.6	2.2	2.1	4.1

* 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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00316.0
Category: G. GAS TRANSMISSION CATHODIC PROTECTION
Category-Sub: 1. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper Group: 003160 - GT Cathodic Protection / 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

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 003160

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00316.0
Category:	G. GAS TRANSMISSION CATHODIC PROTECTION
Category-Sub:	1. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper Group:	003160 - GT Cathodic Protection / Externally Driven
Workpaper Detail:	003160.001 - RAMP - Base Gas Transmission Cathodic Protection / Externally Driven
In-Service Date:	Not Applicable

Description:

This Budget Code includes costs associated with the installation of cathodic protection equipement used to preserve the integrity of transmission pipelines by protecting them from external corrosion. These projects are mandated by federal and state pipeline safety regulations, and enable the maintenance of adequate protection on gas transmission facilities. Costs recorded and estimated in budget categories 306 and 316 are included in this submission.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	285	290	250
Non-Labor	1,642	1,439	969
NSE	0	0	0
Total	**1,927**	**1,729**	**1,219**
FTE	3.1	3.2	2.9

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00316.0
Category:	G. GAS TRANSMISSION CATHODIC PROTECTION
Category-Sub:	1. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper Group:	003160 - GT Cathodic Protection / Externally Driven
Workpaper Detail:	003160.001 - RAMP - Base Gas Transmission Cathodic Protection / Externally Driven

RAMP Item # 1

RAMP Chapter: SCG-4

Program Name: Transmission Cathodic Protection

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

Risk/Mitigation:

Risk: Asset Failure

Mitigation: Requirements for corrision control

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	507	507	507
High	561	561	561

Funding Source: CPUC-GRC

Forecast Method: Base Year

Work Type: Mandated

Work Type Citation: DOT

Historical Embedded Cost Estimates ($000)

Embedded Costs: 504

Explanation:

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00316.0
Category:	G. GAS TRANSMISSION CATHODIC PROTECTION
Category-Sub:	1. GAS TRANSMISSION CATHODIC PROTECTION
Workpaper Group:	003160 - GT Cathodic Protection / Externally Driven
Workpaper Detail:	003160.002 - 36 CP Engines (Bundle)
In-Service Date:	Not Applicable

Description:

This Budget Code includes costs associated with the installation of cathodic protection equipement used to preserve the integrity of transmission pipelines by protecting them from external corrosion. These projects are mandated by federal and state pipeline safety regulations, and enable the maintenance of adequate protection on gas transmission facilities.
Costs recorded and estimated in budget categories 306 and 316 are included in this submission.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	215	333	415
Non-Labor	2,858	4,173	5,024
NSE	0	0	0
Total	**3,073**	**4,506**	**5,439**
FTE	3.7	4.5	4.5

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper: VARIOUS

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

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	2,296	1,443	1,443	1,443
Non-Labor	16,650	17,495	17,495	17,495
NSE	0	0	0	0
Total	**18,946**	**18,938**	**18,938**	**18,938**
FTE	22.2	14.4	14.4	14.4

003080 GT - M&R Stations

Labor	2,296	1,443	1,443	1,443
Non-Labor	16,650	17,495	17,495	17,495
NSE	0	0	0	0
Total	**18,946**	**18,938**	**18,938**	**18,938**
FTE	22.2	14.4	14.4	14.4

00308A Maintain valves with lubrication servicing and replace or install valves for compliance.

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
003080 - GT - M&R Stations

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00308.0
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 003080 - GT - M&R Stations

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Base YR Rec	594	716	1,018	1,432	2,296	1,443	1,443	1,443
Non-Labor	Base YR Rec	4,919	5,712	6,312	17,363	16,650	17,495	17,495	17,495
NSE	Base YR Rec	0	0	0	0	0	0	0	0
Total		**5,513**	**6,429**	**7,330**	**18,795**	**18,946**	**18,938**	**18,938**	**18,938**
FTE	Base YR Rec	6.3	7.8	10.3	14.4	22.2	14.4	14.4	14.4

Business Purpose:

This Budget Code includes costs of installing and rebuilding large meter set assemblies (MSAs) for transmission-served customers and pressure limiting stations on the gas transmission system. These assets require replacement principally for three reasons: aging, change in use patterns and/or population encroachment, and enhancement of the transmission system to address gas quality and capacity issues. The capital work sustains reliable operation of critical transmission assets. 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. This project includes adding and/or replacing critical valves in large pressure regulating stations to comply with federal class location regulations. Also included are local projects to replace or upgrade customer metering sites and large pressure regulating equipment due to age and/or obselesence.

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, maintains this compliance and operating integrity. The forecasts in this Budget Code are based on recorded spending in years 2015 and 2016 which are very close in the $18M range and that greatly exceed spending in the three years prior to 2015. Increased spending in years 2015 and 2016 reflects 1) The advent of needed producer site upgrades related to safety, reliability and reporting which began in 2015, and 2) to opportunities to leverage work already taking place for PSEP-related valve upgrades. These opportunities are afforded due to field crews already on site and active on pressure regulation sites. Multiple work orders can therefore be worked concurrently at reduced costs when needed pressure regulation replacements and upgrades can take place at the same site where PSEP-related valve replacements are taking place. We expect these opportunities and level of spending to continue through 2019 and in the foreseeable years thereafter.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00308.0
Category:	H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub:	1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group:	003080 - GT - M&R Stations

Forecast Methodology:

Labor - Base YR Rec

Labor forecasts in this budget code are based on the level of SoCalGas crew participation in these projects that took place in recorded years 2015 and 2016, which was relatively constant in those years. We expect this participation to continue or to increase through 2019 and for at least several years beyond.

Non-Labor - Base YR Rec

Non-Labor forecasts in this budget code are based on the level of Pipeline contractor utilization in these projects that took place in recorded years 2015 and 2016, which was relatively constant in those years. We expect this utilization to continue or to marginally increase through 2019 and for several years beyond.

NSE - Base YR Rec

Not applicable.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00308.0
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 003080 - GT - 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	Base YR Rec	2,295	2,295	2,295	-852	-852	-852	1,443	1,443	1,443
Non-Labor	Base YR Rec	16,650	16,650	16,650	845	845	845	17,495	17,495	17,495
NSE	Base YR Rec	0	0	0	0	0	0	0	0	0
Total		**18,945**	**18,945**	**18,945**	**-7**	**-7**	**-7**	**18,938**	**18,938**	**18,938**
FTE	Base YR Rec	22.2	22.2	22.2	-7.8	-7.8	-7.8	14.4	14.4	14.4

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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00308.0
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 003080 - GT - M&R Stations

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	520	621	894	1,242	1,971
Non-Labor	5,002	5,774	6,450	17,495	16,650
NSE	0	0	0	0	0
Total	**5,522**	**6,395**	**7,345**	**18,737**	**18,622**
FTE	5.4	6.7	8.8	12.3	19.0
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	520	621	894	1,242	1,971
Non-Labor	5,002	5,774	6,450	17,495	16,650
NSE	0	0	0	0	0
Total	**5,522**	**6,395**	**7,345**	**18,737**	**18,622**
FTE	5.4	6.7	8.8	12.3	19.0
Vacation & Sick (Nominal $)					
Labor	83	103	146	201	325
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**83**	**103**	**146**	**201**	**325**
FTE	0.9	1.1	1.5	2.1	3.2
Escalation to 2016$					
Labor	-10	-8	-22	-11	0
Non-Labor	-83	-62	-138	-132	0
NSE	0	0	0	0	0
Total	**-93**	**-69**	**-161**	**-143**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	594	716	1,018	1,432	2,296
Non-Labor	4,919	5,712	6,312	17,363	16,650
NSE	0	0	0	0	0
Total	**5,513**	**6,429**	**7,330**	**18,795**	**18,946**
FTE	6.3	7.8	10.3	14.4	22.2

* 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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00308.0
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 003080 - GT - 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

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 003080

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00308.0
Category:	H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub:	1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group:	003080 - GT - M&R Stations
Workpaper Detail:	003080.001 - DIVIDE STATION REGULATION UPGRADE SCADA
In-Service Date:	11/30/2017

Description:

Rebuild antiquated regulation station. Add Filter/Separator Vessel to address recent issue with liquids in the pipeline. Replace (4) regulators with (4) new control valves. Replace exisiting telesafe with new Scada Pak. Add (1) new downstream block valve for isolation.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	270	0	0
Non-Labor	2,430	0	0
NSE	0	0	0
Total	**2,700**	**0**	**0**
FTE	2.0	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00308.0
Category:	H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub:	1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group:	003080 - GT - M&R Stations
Workpaper Detail:	003080.002 - L 3003 REPLACE MLV & VAULT 4A WHITE OAK A
In-Service Date:	04/30/2017

Description:

This budget code is for the installation (new, rebuild, and upgrade) of gas metering and regulator stations associated with gas transmission pipeline operation and customers served from those pipelines. The assets include base mechanical and electronic metering systems, pressure regulating and valve stations used in conjunction with volume measurement and gas quality measurement facilities used to compute heating values applied to more than 6 million customers; and to track gas quality regulatory reporting.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	180	0	0
Non-Labor	1,620	0	0
NSE	0	0	0
Total	**1,800**	**0**	**0**
FTE	1.5	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00308.0
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 003080 - GT - M&R Stations
Workpaper Detail: 003080.003 - Biogas

In-Service Date: 08/31/2017

Description:

Prepare Rule 39 preliminary engineering study, Rule 39 detailed engineering study, and procure long lead items for new biogas interconnect.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	150	0	0
Non-Labor	1,350	0	0
NSE	0	0	0
Total	**1,500**	**0**	**0**
FTE	0.2	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00308.0
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 003080 - GT - M&R Stations
Workpaper Detail: 003080.004 - Gaviota Station Redesign ID 403-T Control Valve Upgrade and Install SCADA

In-Service Date: 10/31/2017

Description:

Upgrade antiquated control valves and install SCADA system to provide remote control capabilities for Gas Control.
Install filter/separator and upgrade orifice meter to bring station to company standards.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	150	0	0
Non-Labor	1,350	0	0
NSE	0	0	0
Total	**1,500**	**0**	**0**
FTE	0.2	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00308.0
Category:	H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub:	1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group:	003080 - GT - M&R Stations
Workpaper Detail:	003080.005 - L1185 NEW PRESSURE LIMITING STA @ MP 5
In-Service Date:	06/30/2017

Description:

Installtion of a new pressure limiting station (L1185 MP 5 Victorville) in response to class location changes. Installation to include valves, taps, fittings, pipe and bridle onto the existing 36" line. Removal of existing pipe sections and fittings to facilitate installation of new PLS. A SCADA Pack electrical and communications equipment will also be installed.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	100	0	0
Non-Labor	900	0	0
NSE	0	0	0
Total	**1,000**	**0**	**0**
FTE	0.5	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00308.0
Category:	H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub:	1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group:	003080 - GT - M&R Stations
Workpaper Detail:	003080.006 - Cordes Crossover
In-Service Date:	11/30/2017

Description:

This budget code is for the installation (new, rebuild, and upgrade) of gas metering and regulator stations associated with gas transmission pipeline operation and customers served from those pipelines. The assets include base mechanical and electronic metering systems, pressure regulating and valve stations used in conjunction with volume measurement and gas quality measurement facilities used to compute heating values applied to more than 6 million customers; and to track gas quality regulatory reporting.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	100	0	0
Non-Labor	900	0	0
NSE	0	0	0
Total	**1,000**	**0**	**0**
FTE	0.5	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00308.0
Category:	H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub:	1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group:	003080 - GT - M&R Stations
Workpaper Detail:	003080.007 - Quigley Station Upgrade Controls & Meter Equipment Upgrade
In-Service Date:	06/30/2019

Description:

This budget code is for the installation (new, rebuild, and upgrade) of gas metering and regulator stations associated with gas transmission pipeline operation and customers served from those pipelines. The assets include base mechanical and electronic metering systems, pressure regulating and valve stations used in conjunction with volume measurement and gas quality measurement facilities used to compute heating values applied to more than 6 million customers; and to track gas quality regulatory reporting.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	200	400	200
Non-Labor	1,800	3,600	1,800
NSE	0	0	0
Total	**2,000**	**4,000**	**2,000**
FTE	2.0	3.0	2.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00308.0
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 003080 - GT - M&R Stations
Workpaper Detail: 003080.008 - Bulk Projects

In-Service Date: Not Applicable

Description:

This workpaper covers work for valve bundles, methane detectors, and retrofit optics.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	293	1,043	1,243
Non-Labor	7,145	13,895	15,695
NSE	0	0	0
Total	**7,438**	**14,938**	**16,938**
FTE	7.5	11.4	12.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00308A - Maintain valves with lubrication servicing and replace or install valves for compliance

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00308.0
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 00308A - Maintain valves with lubrication servicing and replace or install valves for compliance.

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
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:

Physical Description:

Project Justification:

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00308.0
Category:	H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub:	1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group:	00308A - Maintain valves with lubrication servicing and replace or install valves for compliance.

Forecast Methodology:

Labor - Zero-Based

Non-Labor - Zero-Based

NSE - Zero-Based

Beginning of Workpaper Sub Details for
Workpaper Group 00308A

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00308.0
Category: H. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Category-Sub: 1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group: 00308A - Maintain valves with lubrication servicing and replace or install valves for compliance.
Workpaper Detail: 00308A.001 - RAMP - Base Valve Maintenance and Installation

In-Service Date: 01/31/2019

Description:

Maintain valves with lubrication and servicing and replace or install valves required for compliance. Projects relate to valve replacements or retrofit of capital equipment to allow for effective valve servicing.

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.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00308.0
Category:	H. GAS TRANSMISSION MEASUREMENT & REGULATION STATI
Category-Sub:	1. GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS
Workpaper Group:	00308A - Maintain valves with lubrication servicing and replace or install valves for compliance.
Workpaper Detail:	00308A.001 - RAMP - Base Valve Maintenance and Installation

RAMP Item # 1

RAMP Chapter: SCG-4

Program Name: Valve Maintenance and Installation (Transmission)

Program Description: Replace or retrofit of capital equipment to allow for effective valve servicing.

Risk/Mitigation:

Risk: High Pressure Pipeline Failure

Mitigation: Valve Maintenance and Installation

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	5,713	5,713	5,713
High	5,713	5,713	5,713

Funding Source: CPUC-GRC

Forecast Method: Base Year

Work Type: Mandated

Work Type Citation: DOT

Historical Embedded Cost Estimates ($000)

Embedded Costs: 5713

Explanation:

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper: VARIOUS

Summary for Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	393	619	531	798
Non-Labor	2,928	10,091	8,565	11,952
NSE	0	0	0	0
Total	**3,321**	**10,710**	**9,096**	**12,750**
FTE	4.1	3.4	3.2	4.2
003090 GT - Aux Equipment				
Labor	393	619	531	798
Non-Labor	2,928	9,695	8,169	11,552
NSE	0	0	0	0
Total	**3,321**	**10,314**	**8,700**	**12,350**
FTE	4.1	3.4	3.2	4.2
00309A RAMP- Strain Gauge installation projects				
Labor	0	0	0	0
Non-Labor	0	396	396	400
NSE	0	0	0	0
Total	**0**	**396**	**396**	**400**
FTE	0.0	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
003090 - GT - Aux Equipment

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00309.0
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub: 1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group: 003090 - GT - Aux Equipment

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	434	321	409	449	393	619	531	798
Non-Labor	Zero-Based	6,567	7,873	3,888	5,042	2,928	9,695	8,169	11,552
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**7,002**	**8,194**	**4,298**	**5,491**	**3,322**	**10,314**	**8,700**	**12,350**
FTE	Zero-Based	4.7	3.3	4.3	4.7	4.1	3.4	3.2	4.2

Business Purpose:

Requested funding in this category includes new installations or upgrades of aging M&R station and pipeline system control and telemetry systems which link with and provide information to, but are not a direct part of SoCalGas centralized SCADA computer system. Also included are telemetry-related upgrades to remote site security systems and remote control systems for critical in-line valves.This work paper represents seven such projects whose individual funding is less than that typically appearing on separate work papers and is thus presented for consideration here as a “blanket” submission.This work paper includes recorded and estimated costs in budget codes 309, 319 and 339.

Physical Description:

Included are local controls and communication devices such as programmable logic controllers (PLCs), pressure transmitters, gas quality remote sensors, communication interfaces/technologies, intrusion monitoring & alerting systems and real-time video monitoring.. This equipment is used to control the flow of gas in pipelines, valves and regulator stations both locally and through the initiation of remote commands and for enhanced security for remote sites where transmission facilities are either above ground or reside in concrete vaults.

Project Justification:

This capital work contributes to reliable operation of critical transmission assets to the extent that they are not compromised by equipment deployed past its useful life or by physical sabotage that can occur in remote settings. Some assets require replacement due to aging, change in use patterns, or enhancement of the transmission system to contend with gas quality and capacity issues, and security needs in an increasingly complex environment where exposure to risk is being constantly evaluated.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00309.0
Category:	I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub:	1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group:	003090 - GT - Aux Equipment

Forecast Methodology:

Labor - Zero-Based

Labor content is based on the estimated project activity in this budget code.

Non-Labor - Zero-Based

Project costs are based on recorded projects of similar scope, environment, pipe size and workforce deployment.

NSE - Zero-Based

None. This is Gas Transmission capital equipment.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00309.0
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub: 1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group: 003090 - GT - Aux Equipment

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	619	531	798	619	531	798
Non-Labor	Zero-Based	0	0	0	9,695	8,169	11,552	9,695	8,169	11,552
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**10,314**	**8,700**	**12,350**	**10,314**	**8,700**	**12,350**
FTE	Zero-Based	0.0	0.0	0.0	3.4	3.2	4.2	3.4	3.2	4.2

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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00309.0
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub: 1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group: 003090 - GT - Aux Equipment

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	381	278	360	389	338
Non-Labor	6,677	7,958	3,973	5,080	2,928
NSE	0	0	0	0	0
Total	**7,058**	**8,236**	**4,333**	**5,470**	**3,266**
FTE	4.0	2.8	3.7	4.0	3.5
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	381	278	360	389	338
Non-Labor	6,677	7,958	3,973	5,080	2,928
NSE	0	0	0	0	0
Total	**7,058**	**8,236**	**4,333**	**5,470**	**3,266**
FTE	4.0	2.8	3.7	4.0	3.5
Vacation & Sick (Nominal $)					
Labor	61	46	59	63	56
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**61**	**46**	**59**	**63**	**56**
FTE	0.7	0.5	0.6	0.7	0.6
Escalation to 2016$					
Labor	-7	-3	-9	-3	0
Non-Labor	-110	-85	-85	-38	0
NSE	0	0	0	0	0
Total	**-118**	**-88**	**-94**	**-42**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	434	321	409	449	393
Non-Labor	6,567	7,873	3,888	5,042	2,928
NSE	0	0	0	0	0
Total	**7,002**	**8,194**	**4,298**	**5,491**	**3,322**
FTE	4.7	3.3	4.3	4.7	4.1

* 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.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00309.0
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub: 1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group: 003090 - GT - Aux Equipment

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

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 003090

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00309.0
Category:	I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub:	1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group:	003090 - GT - Aux Equipment
Workpaper Detail:	003090.001 - Newberry Springs Water Line Replacement Project
In-Service Date:	10/31/2017

Description:

The main water supply for the Newberry Springs is sourced from two opposite wells. The water supply pipeline is concrete lined with asbestos (transite pipe). The transite water supply pipe needs to be replaced. Approximately 4,520 feet of transite pipe will be replaced with 4,720 feet of plastic water supply pipe.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	310	0	0
Non-Labor	4,127	0	0
NSE	0	0	0
Total	**4,437**	**0**	**0**
FTE	1.5	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00309.0
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub: 1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group: 003090 - GT - Aux Equipment
Workpaper Detail: 003090.002 - Wooden Vault Replacements Bulks bundle

In-Service Date: Not Applicable

Description:

To replace deteriorating wooden vaults with a concrete vault with supports inside.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	175	210	210
Non-Labor	2,325	2,790	2,790
NSE	0	0	0
Total	**2,500**	**3,000**	**3,000**
FTE	1.0	1.5	1.5

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00309.0
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub: 1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group: 003090 - GT - Aux Equipment
Workpaper Detail: 003090.003 - Blythe Station Security Upgrades

In-Service Date: 11/30/2019

Description:

Facility requires installation of security upgrades.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	63	0	0
Non-Labor	837	0	0
NSE	0	0	0
Total	**900**	**0**	**0**
FTE	0.2	0.0	0.0

Note: Totals may include rounding differences.

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00309.0
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub: 1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group: 003090 - GT - Aux Equipment
Workpaper Detail: 003090.004 - RAMP - Incremental Blanket projects

In-Service Date: Not Applicable

Description:

Estimated costs in this category include installations and upgrades to aging M&R stations. As well as security upgrades to facilities as well as actuator replacements.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	71	258	450
Non-Labor	2,406	4,542	7,550
NSE	0	0	0
Total	**2,477**	**4,800**	**8,000**
FTE	0.7	1.6	2.5

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00309.0
Category:	I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub:	1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group:	003090 - GT - Aux Equipment
Workpaper Detail:	003090.004 - RAMP - Incremental Blanket projects

RAMP Item # 1

RAMP Chapter: SCG-6

Program Name: Operational Resiliency

Program Description: Develop and implement operational flexibility, which may include redundant pipeline system capabilities, backup equipment and resources, resumption planning and exercises

Risk/Mitigation:

Risk: Physical Security of Critical Infrastructure sites

Mitigation: Operations Mitigation

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	600	5,500	6,200
High	1,000	7,500	9,200

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Mandated

Work Type Citation: n/a

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00309.0
Category:	I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub:	1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group:	003090 - GT - Aux Equipment
Workpaper Detail:	003090.004 - RAMP - Incremental Blanket projects

RAMP Item # 2

RAMP Chapter: SCG-6

Program Name: Physical Security Systems

Program Description: Physical security measures put in place for the security/safety of employees and infrastructure

Risk/Mitigation:

Risk: Asset Failure

Mitigation: Physical security measures put in place for the security/safety of employees and infrastructure

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	2,065	2,065	2,065
High	2,697	2,697	2,697

Funding Source: Other

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: N/A

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00309.0
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub: 1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group: 003090 - GT - Aux Equipment
Workpaper Detail: 003090.005 - Moisture Analyzers

In-Service Date: 06/30/2019

Description:

Install moisture analyzers on pipeline fitting that connects to SCADA to monitor moisture content.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	63	138
Non-Labor	0	837	1,212
NSE	0	0	0
Total	**0**	**900**	**1,350**
FTE	0.0	0.1	0.2

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00309A - RAMP- Strain Gauge installation projects

Area: GAS TRANSMISSION
Witness: Elizabeth A. Musich
Budget Code: 00309.0
Category: I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub: 1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group: 00309A - RAMP- Strain Gauge installation projects

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	0	0	0	0	0	396	396	400
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**396**	**396**	**400**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

This will cover installation of strain gauges to monitor ground movement.

Physical Description:

Installation of strain gauges at critical areas.

Project Justification:

Pipelines running through mountainous areas are susceptible to washouts and landslides.

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00309.0
Category:	I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub:	1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group:	00309A - RAMP- Strain Gauge installation projects

Forecast Methodology:

Labor - Zero-Based

Labor costs were based on an estimate prepared by personnel experienced in this type of work and with reference to projects of similar scope.

Non-Labor - Zero-Based

Non-labor costs for this project consist of contracted labor, equipment, materials. 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

Beginning of Workpaper Sub Details for
Workpaper Group 00309A

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00309.0
Category:	I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub:	1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group:	00309A - RAMP- Strain Gauge installation projects
Workpaper Detail:	00309A.001 - RAMP - Incremental Real time monitoring of land movement via stress acting on infrastru
In-Service Date:	03/31/2019

Description:

Installation of strain gauge in areas susceptible to landslides. Strain gauges allow SoCalGas to monitor the strain on existing transmission pipeline resulting from localized land movement. Should the strain exceed actionable limits, SoCalGas will promptly repair or replace the segment of pipeline.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	396	396	400
NSE	0	0	0
Total	**396**	**396**	**400**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Area:	GAS TRANSMISSION
Witness:	Elizabeth A. Musich
Budget Code:	00309.0
Category:	I. GAS TRANSMISSION AUXILIARY EQUIPMENT
Category-Sub:	1. GAS TRANSMISSION AUXILIARY EQUIPMENT
Workpaper Group:	00309A - RAMP- Strain Gauge installation projects
Workpaper Detail:	00309A.001 - RAMP - Incremental Real time monitoring of land movement via stress acting on infrastructure

RAMP Item # 1

RAMP Chapter: SCG-9

Program Name: Strain Gauge Installation Projects

Program Description: Real time monitoring of land movement via stress acting on infrastructure

Risk/Mitigation:

Risk: Force of Nature

Mitigation: Strain Gauge Installation Projects

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	400	400	400
High	700	700	700

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: Force of nature

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: