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

Application No. 17-10-007

Exhibit No.: (SDG&E-14-CWP-R)

REVISED CAPITAL WORKPAPERS TO PREPARED DIRECT TESTIMONY OF ALAN F. COLTON ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

DECEMBER 2017

SDGE

A Sempra Energy utility®

2019 General Rate Case - REVISED

INDEX OF WORKPAPERS

Exhibit SDG&E-14-CWP-R - ELECTRIC DISTRIBUTION

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Exhibit SDG&E-14-CWP-R - ELECTRIC DISTRIBUTION

Overall Summary For Exhibit No. SDG&E-14-CWP-R

Area: ELECTRIC DISTRIBUTION

Witness: Alan F. Colton

	In 2016 $ (000) Adjusted-Forecast		
	2017	2018	2019
A. CAPACITY/EXPANSION	13,269	11,002	25,176
B. EQUIP/TOOLS/MISC	4,833	2,531	3,029
C. FRANCHISE	34,463	40,180	35,190
D. MANDATED	33,169	34,377	32,662
E. MATERIALS	24,871	26,315	27,694
F. NEW BUSINESS	55,317	57,186	60,592
G. OVERHEAD POOLS	85,103	120,386	162,491
H. RELIABILITY/IMPROVEMENTS	74,863	108,418	103,448
I. SAFETY & RISK MANAGEMENT	83,747	113,497	184,333
J. DER INTEGRATION	3,298	18,343	18,016
K. TRANSMISSION/FERC DRIVEN PROJECTS	32,183	57,576	50,118
Total	**445,116**	**589,811**	**702,749**

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: A. CAPACITY/EXPANSION
Workpaper: VARIOUS

Summary for Category: A. CAPACITY/EXPANSION

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	722	4,260	2,049	2,323
Non-Labor	10,372	9,009	8,953	22,853
NSE	0	0	0	0
Total	**11,094**	**13,269**	**11,002**	**25,176**
FTE	6.2	41.5	19.2	21.9
002090 Field Shunt Capacitors				
Labor	44	102	102	102
Non-Labor	476	485	485	485
NSE	0	0	0	0
Total	**520**	**587**	**587**	**587**
FTE	0.4	0.9	0.9	0.9
162670 C1447 MTO: EXTENSION & OFFLOAD FROM C958				
Labor	0	156	0	0
Non-Labor	0	234	0	0
NSE	0	0	0	0
Total	**0**	**390**	**0**	**0**
FTE	0.0	1.6	0.0	0.0
162680 C1450, MTO:NEW 12 KV CIRCUIT				
Labor	0	0	541	0
Non-Labor	0	0	678	0
NSE	0	0	0	0
Total	**0**	**0**	**1,219**	**0**
FTE	0.0	0.0	5.4	0.0
162690 JAMACHA NEW BANK & NEW 12KV CIRCUIT				
Labor	0	0	114	1,348
Non-Labor	0	0	330	3,830
NSE	0	0	0	0
Total	**0**	**0**	**444**	**5,178**
FTE	0.0	0.0	1.1	13.4
162720 DOHENY DESALINATION 15MW PROJECT				
Labor	0	0	0	0
Non-Labor	0	0	0	366
NSE	0	0	0	0
Total	**0**	**0**	**0**	**366**
FTE	0.0	0.0	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: A. CAPACITY/EXPANSION
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
972480 Distribution System Capacity Improvement				
Labor	187	264	264	264
Non-Labor	921	1,469	1,469	1,469
NSE	0	0	0	0
Total	**1,108**	**1,733**	**1,733**	**1,733**
FTE	1.4	2.1	2.1	2.1
002280 Reactive Small Capital Projects				
Labor	97	242	242	242
Non-Labor	1,222	1,589	1,589	1,589
NSE	0	0	0	0
Total	**1,319**	**1,831**	**1,831**	**1,831**
FTE	0.7	1.9	1.9	1.9
022580 Salt Creek Substation & New Circuits				
Labor	281	766	0	0
Non-Labor	6,833	2,570	0	0
NSE	0	0	0	0
Total	**7,114**	**3,336**	**0**	**0**
FTE	2.7	7.7	0.0	0.0
052530 Ocean Ranch 69/12KV Substation				
Labor	81	67	512	194
Non-Labor	775	103	3,347	14,364
NSE	0	0	0	0
Total	**856**	**170**	**3,859**	**14,558**
FTE	0.8	0.7	5.1	1.9
082530 Substation 12kV Capacitor Upgrades				
Labor	32	173	173	173
Non-Labor	41	750	750	750
NSE	0	0	0	0
Total	**73**	**923**	**923**	**923**
FTE	0.2	1.7	1.7	1.7
08260A The project requires trenching and installing conduit as well as 1000 kcmil cable along w				
Labor	0	936	0	0
Non-Labor	0	904	0	0
NSE	0	0	0	0
Total	**0**	**1,840**	**0**	**0**
FTE	0.0	9.4	0.0	0.0
112560 C1023 LI New 12kV Circuit & Reconductor C354				
Labor	0	1,554	0	0
Non-Labor	104	905	0	0
NSE	0	0	0	0
Total	**104**	**2,459**	**0**	**0**
FTE	0.0	15.5	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: A. CAPACITY/EXPANSION
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
16142A GRID Modernization				
Labor	0	0	101	0
Non-Labor	0	0	305	0
NSE	0	0	0	0
Total	**0**	**0**	**406**	**0**
FTE	0.0	0.0	1.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002090 - Field Shunt Capacitors

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00209.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 1. FIELD SHUNT CAPACITORS
Workpaper Group: 002090 - Field Shunt Capacitors

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	122	150	112	82	44	102	102	102
Non-Labor	5-YR Average	637	388	368	556	476	485	485	485
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**759**	**537**	**480**	**638**	**520**	**587**	**587**	**587**
FTE	5-YR Average	1.0	1.3	1.1	0.8	0.4	0.9	0.9	0.9

Business Purpose:

Shunt capacitors installed on electric distribution circuits improve power factor and reduce the ampere loading on distribution circuits, substation transformers, transmission lines, and from generators. Capacitors installed on distribution circuits also improve system voltage and voltage control on both distribution circuits and transmission lines. This project is required to achieve the present design standard of 0.995 (lagging) at the substation bus and to maintain this standard in the future years through the use of shunt capacitors. This project will also provide funding for relocating capacitors from downstream of fuses to upstream of fuses to meet SDG&E current standards.

Physical Description:

This project provides installation of overhead and underground shunt capacitors on 4kV and 12kV distribution circuits.

Project Justification:

Reactive power requirements increase with load growth. Capacitors are needed to efficiently supply reactive power to meet the growth while maintaining a system power factor of at least 0.995 lag measured at the substation bus. The .995 lagging power factor value satisfies current SDG&E Design Standards. This project is also required to provide funding for relocating existing capacitors that do not comply with SDG&E current standards in capacitor placement.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00209.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	1. FIELD SHUNT CAPACITORS
Workpaper Group:	002090 - Field Shunt Capacitors

Forecast Methodology:

Labor - 5-YR Average

The forecast method used for Field Shunt Capacitors is a 5-year average, based on historical data. This is the most appropriate methodology, as work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a larger period of time, and still provides for the necessary level of funding for the work that falls within this budget.

Non-Labor - 5-YR Average

The forecast method used for Field Shunt Capacitors is a 5-year average, based on historical data. This is the most appropriate methodology, as work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a larger period of time, and still provides for the necessary level of funding for the work that falls within this budget.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00209.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 1. FIELD SHUNT CAPACITORS
Workpaper Group: 002090 - Field Shunt Capacitors

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	101	101	101	1	1	1	102	102	102
Non-Labor	5-YR Average	485	485	485	0	0	0	485	485	485
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**586**	**586**	**586**	**1**	**1**	**1**	**587**	**587**	**587**
FTE	5-YR Average	0.9	0.9	0.9	0.0	0.0	0.0	0.9	0.9	0.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00209.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 1. FIELD SHUNT CAPACITORS
Workpaper Group: 002090 - Field Shunt Capacitors

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	96	121	93	70	37
Non-Labor	575	362	354	549	476
NSE	0	0	0	0	0
Total	**671**	**483**	**448**	**619**	**514**
FTE	0.9	1.1	0.9	0.7	0.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	96	121	93	70	37
Non-Labor	575	362	354	549	476
NSE	0	0	0	0	0
Total	**671**	**483**	**448**	**619**	**514**
FTE	0.9	1.1	0.9	0.7	0.3
Vacation & Sick (Nominal $)					
Labor	14	19	15	11	6
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**14**	**19**	**15**	**11**	**6**
FTE	0.1	0.2	0.2	0.1	0.1
Escalation to 2016$					
Labor	12	10	4	1	0
Non-Labor	63	26	14	8	0
NSE	0	0	0	0	0
Total	**75**	**35**	**18**	**9**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	122	150	112	82	44
Non-Labor	637	388	368	556	476
NSE	0	0	0	0	0
Total	**759**	**537**	**480**	**638**	**520**
FTE	1.0	1.3	1.1	0.8	0.4

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00209.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 1. FIELD SHUNT CAPACITORS
Workpaper Group: 002090 - Field Shunt Capacitors

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 002090

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00209.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 1. FIELD SHUNT CAPACITORS
Workpaper Group: 002090 - Field Shunt Capacitors
Workpaper Detail: 002090.001 - FIELD SHUNG CAPACITORS

In-Service Date: Not Applicable

Description:

This project provides installation of overhead and underground shunt capacitors on 4kV and 12kV distribution circuits.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	102	102	102
Non-Labor	485	485	485
NSE	0	0	0
Total	**587**	**587**	**587**
FTE	0.9	0.9	0.9

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002280 - Reactive Small Capital Projects

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00228.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 2. REACTIVE SMALL CAPITAL PROJECTS
Workpaper Group: 002280 - Reactive Small Capital Projects

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	276	318	414	103	97	242	242	242
Non-Labor	5-YR Average	1,260	1,323	2,413	1,728	1,222	1,589	1,589	1,589
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**1,536**	**1,641**	**2,827**	**1,831**	**1,319**	**1,831**	**1,831**	**1,831**
FTE	5-YR Average	2.0	2.8	3.4	0.7	0.7	1.9	1.9	1.9

Business Purpose:

This project is required to address primary distribution system overload and voltage related issues with individual capital jobs requiring quick modifications to the system. It is intended for the capacity projects that are not covered under the specific capital budget process. This type of project often requires a short turnaround time to address the overload and cannot be handled through the specific capital budget process. For example, an overload condition may occur when customers have a significant increase in load and did not communicate it to the utility. It is also required to meet the SDG&E Design Standards.

Physical Description:

This project provides the reconstruction and extension of overhead and underground distribution facilities to replace overloaded conductors, correct primary voltage problems, and transfer load to balance circuits and substations. Other minor modifications that may be required to delay larger specific projects are also included in this budget. Additionally, this project installs remote metering equipment to monitor questionable circuit loading.

Project Justification:

A cost benefit analysis will be performed for various alternatives to remedy the overload on the distribution system. The project with the lowest overall cost will be proposed.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00228.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	2. REACTIVE SMALL CAPITAL PROJECTS
Workpaper Group:	002280 - Reactive Small Capital Projects

Forecast Methodology:

Labor - 5-YR Average

The forecast method used for Reactive Small Capital Projects is a 5 year average, based on historical data. This is the most appropriate as work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a larger period of time, and still provides for the necessary level of funding for the work that falls within this budget.

Non-Labor - 5-YR Average

The forecast method used for Reactive Small Capital Projects is a 5 year average, based on historical data. This is the most appropriate as work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a larger period of time, and still provides for the necessary level of funding for the work that falls within this budget.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00228.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 2. REACTIVE SMALL CAPITAL PROJECTS
Workpaper Group: 002280 - Reactive Small Capital Projects

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	241	241	241	1	1	1	242	242	242
Non-Labor	5-YR Average	1,589	1,589	1,589	0	0	0	1,589	1,589	1,589
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**1,830**	**1,830**	**1,830**	**1**	**1**	**1**	**1,831**	**1,831**	**1,831**
FTE	5-YR Average	1.9	1.9	1.9	0.0	0.0	0.0	1.9	1.9	1.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00228.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 2. REACTIVE SMALL CAPITAL PROJECTS
Workpaper Group: 002280 - Reactive Small Capital Projects

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	217	257	343	88	83
Non-Labor	1,137	1,236	2,324	1,704	1,222
NSE	0	0	0	0	0
Total	**1,354**	**1,492**	**2,667**	**1,793**	**1,305**
FTE	1.7	2.4	2.9	0.6	0.6
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	217	257	343	88	83
Non-Labor	1,137	1,236	2,324	1,704	1,222
NSE	0	0	0	0	0
Total	**1,354**	**1,492**	**2,667**	**1,793**	**1,305**
FTE	1.7	2.4	2.9	0.6	0.6
Vacation & Sick (Nominal $)					
Labor	31	41	55	14	14
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**31**	**41**	**55**	**14**	**14**
FTE	0.3	0.4	0.5	0.1	0.1
Escalation to 2016$					
Labor	27	21	15	1	0
Non-Labor	124	87	89	24	0
NSE	0	0	0	0	0
Total	**151**	**108**	**105**	**25**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	276	318	414	103	97
Non-Labor	1,260	1,323	2,413	1,728	1,222
NSE	0	0	0	0	0
Total	**1,536**	**1,641**	**2,827**	**1,831**	**1,319**
FTE	2.0	2.8	3.4	0.7	0.7

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00228.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 2. REACTIVE SMALL CAPITAL PROJECTS
Workpaper Group: 002280 - Reactive Small Capital Projects

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 002280

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00228.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	2. REACTIVE SMALL CAPITAL PROJECTS
Workpaper Group:	002280 - Reactive Small Capital Projects
Workpaper Detail:	002280.001 - REACTIVE SMALL CAPITAL PROJECTS
In-Service Date:	Not Applicable

Description:

This project provides the reconstruction and extension of overhead and underground distribution facilities to replace overloaded conductors, correct primary voltage problems, and transfer load to balance circuits and substations. Other minor modifications that may be required to delay larger specific projects are also included in this budget. Additionally, this
project installs remote metering equipment to monitor questionable circuit loading.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	242	242	242
Non-Labor	1,589	1,589	1,589
NSE	0	0	0
Total	**1,831**	**1,831**	**1,831**
FTE	1.9	1.9	1.9

Note: Totals may include rounding differences.

Beginning of Workpaper Group
022580 - Salt Creek Substation & New Circuits

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 02258.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 3. SALT CREEK SUBSTATION & NEW CIRCUITS
Workpaper Group: 022580 - Salt Creek Substation & New Circuits

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	160	116	110	72	281	766	0	0
Non-Labor	Zero-Based	474	401	1,186	930	6,833	2,570	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**634**	**518**	**1,296**	**1,002**	**7,114**	**3,336**	**0**	**0**
FTE	Zero-Based	1.6	1.2	1.0	0.6	2.7	7.7	0.0	0.0

Business Purpose:

The purpose is to build the new low-profile Salt Creek Substation in the Otay Ranch-Chula Vista Area. SDGE will install a 69/12kV substation with an ultimate capacity of 120MVA that provides future required capacity to the rapidly developing area and increase the substation /circuit reliability. The new Salt Creek Substation is required to assist with serving the ultimate load for the Southeastern Chula Vista area. The project also includes looping in an existing 69kV tieline (TL6910) to the Salt Creek substation.

Physical Description:

Build a new low-profile 69/12kV substation in Chula Vista, CA on previously purchased land connecting underground to an existing overhead 69kV power line. The substation will initially be built out with two banks with the potential for four ultimately. Four new distribution circuits will be installed and will intercept existing circuits in the area.

Project Justification:

The new Salt Creek Substation is required to serve the ultimate load for the area and continued load growth. The southeastern Chula Vista area is fed primarily from existing Telegraph Canyon and Proctor Valley Substations, both of which currently exceed the optimum maximum loading of 85%. The optimum maximum substation loading is 85%, which allows transformer bank load transfer in the event of a transformer bank outage. Optimum operating conditions improve substation reliability and reduce outage time. In addition, the new substation will provide improved substation and circuit reliability with added tie capacity. The installation of a new substation will provide additional new substation transformer banks and circuits, and offer an increased number of circuit ties. Reliability improves with balanced circuit loading and more circuits to transfer load in the event of a circuit or branch outage.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	02258.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	3. SALT CREEK SUBSTATION & NEW CIRCUITS
Workpaper Group:	022580 - Salt Creek Substation & New Circuits

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 02258.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 3. SALT CREEK SUBSTATION & NEW CIRCUITS
Workpaper Group: 022580 - Salt Creek Substation & New Circuits

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	766	0	0	0	0	0	766	0	0
Non-Labor	Zero-Based	2,570	0	0	0	0	0	2,570	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**3,336**	**0**	**0**	**0**	**0**	**0**	**3,336**	**0**	**0**
FTE	Zero-Based	7.7	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 02258.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 3. SALT CREEK SUBSTATION & NEW CIRCUITS
Workpaper Group: 022580 - Salt Creek Substation & New Circuits

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	126	94	91	62	241
Non-Labor	427	375	1,142	917	6,833
NSE	0	0	0	0	0
Total	**554**	**469**	**1,234**	**979**	**7,074**
FTE	1.4	1.0	0.8	0.5	2.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	126	94	91	62	241
Non-Labor	427	375	1,142	917	6,833
NSE	0	0	0	0	0
Total	**554**	**469**	**1,234**	**979**	**7,074**
FTE	1.4	1.0	0.8	0.5	2.3
Vacation & Sick (Nominal $)					
Labor	18	15	15	10	40
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**18**	**15**	**15**	**10**	**40**
FTE	0.2	0.2	0.2	0.1	0.4
Escalation to 2016$					
Labor	16	8	4	1	0
Non-Labor	47	26	44	13	0
NSE	0	0	0	0	0
Total	**62**	**34**	**48**	**14**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	160	116	110	72	281
Non-Labor	474	401	1,186	930	6,833
NSE	0	0	0	0	0
Total	**634**	**518**	**1,296**	**1,002**	**7,114**
FTE	1.6	1.2	1.0	0.6	2.7

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 02258.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 3. SALT CREEK SUBSTATION & NEW CIRCUITS
Workpaper Group: 022580 - Salt Creek Substation & New Circuits

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 022580

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	02258.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	3. SALT CREEK SUBSTATION & NEW CIRCUITS
Workpaper Group:	022580 - Salt Creek Substation & New Circuits
Workpaper Detail:	022580.001 - SALT CREEK SUBSTATION & NEW CIRCUITS
In-Service Date:	08/31/2017

Description:

Build a new low-profile 69/12kV substation in Chula Vista CA on previously purchased land connecting underground to an existing overhead 69kV power line. The substation will initially be built out with two banks with the potential for four ultimately. Underground distribution circuits will exit the substation and be routed up to Hunte Parkway and for distribution to the area in city streets thereafter.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	766	0	0
Non-Labor	2,570	0	0
NSE	0	0	0
Total	**3,336**	**0**	**0**
FTE	7.7	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
052530 - Ocean Ranch 69/12KV Substation

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 05253.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 4. Ocean Ranch 69/12KV Substation
Workpaper Group: 052530 - Ocean Ranch 69/12KV Substation

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	20	-11	47	120	81	67	512	194
Non-Labor	Zero-Based	5,470	-5,197	29	574	775	103	3,347	14,364
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**5,491**	**-5,208**	**76**	**694**	**857**	**170**	**3,859**	**14,558**
FTE	Zero-Based	0.2	0.0	0.5	1.3	0.8	0.7	5.1	1.9

Business Purpose:

The purpose of this project is to build an ultimate 120MVA substation in the southeastern portion of the City of Oceanside, within the Pacific Coast Business Park, which is part of the Rancho Del Oro Specific Plan area. The new substation will assist wtih meeting the electric distribution load growth and reliabiliy limitations.

Physical Description:

Purchase land and install ultimate 120MVA substation capacity in Ocean Ranch / Rancho Del Oro area. Ocean Ranch / Rancho Del Oro are new industrial park developments located approximately 3.5 miles east of San Luis Rey substation and approximately 4 miles west of Melrose substation. The substation will initially be built out with two 69/12kV transformers, with the potential for four transformers. Four new distribution circuits will be installed and will intercept existing circuits in the area.

Project Justification:

The new substation will provide additional capacity to serve existing area load, as well as forecasted customer-driven electrical load growth, and prevent potential long outages or disruption of service to existing customers in the Oceanside area. There are three substations in the area (ME, SA, and MH) that are all forecasted above the optimum operating conditions. This project will reduce the capacity deficiency for the area, operation flexibility will be improved and reliability inceased.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	05253.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	4. Ocean Ranch 69/12KV Substation
Workpaper Group:	052530 - Ocean Ranch 69/12KV Substation

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 05253.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 4. Ocean Ranch 69/12KV Substation
Workpaper Group: 052530 - Ocean Ranch 69/12KV Substation

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	67	512	194	0	0	0	67	512	194
Non-Labor	Zero-Based	103	3,347	14,364	0	0	0	103	3,347	14,364
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**170**	**3,859**	**14,558**	**0**	**0**	**0**	**170**	**3,859**	**14,558**
FTE	Zero-Based	0.7	5.1	1.9	0.0	0.0	0.0	0.7	5.1	1.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 05253.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 4. Ocean Ranch 69/12KV Substation
Workpaper Group: 052530 - Ocean Ranch 69/12KV Substation

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	16	-9	39	103	70
Non-Labor	4,933	-4,855	27	566	775
NSE	0	0	0	0	0
Total	**4,948**	**-4,864**	**67**	**669**	**845**
FTE	0.2	0.0	0.4	1.1	0.7
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	16	-9	39	103	70
Non-Labor	4,933	-4,855	27	566	775
NSE	0	0	0	0	0
Total	**4,948**	**-4,864**	**67**	**669**	**845**
FTE	0.2	0.0	0.4	1.1	0.7
Vacation & Sick (Nominal $)					
Labor	2	-1	6	16	12
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**2**	**-1**	**6**	**16**	**12**
FTE	0.0	0.0	0.1	0.2	0.1
Escalation to 2016$					
Labor	2	-1	2	2	0
Non-Labor	538	-342	1	8	0
NSE	0	0	0	0	0
Total	**540**	**-343**	**3**	**10**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	20	-11	47	120	81
Non-Labor	5,470	-5,197	29	574	775
NSE	0	0	0	0	0
Total	**5,491**	**-5,208**	**76**	**694**	**857**
FTE	0.2	0.0	0.5	1.3	0.8

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 05253.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 4. Ocean Ranch 69/12KV Substation
Workpaper Group: 052530 - Ocean Ranch 69/12KV Substation

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 052530

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	05253.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	4. Ocean Ranch 69/12KV Substation
Workpaper Group:	052530 - Ocean Ranch 69/12KV Substation
Workpaper Detail:	052530.001 - Ocean Ranch 69/12KV Substation
In-Service Date:	09/30/2019

Description:

Purchase land and install ultimate 120MVA Substation in Ocean Ranch / Rancho Del Oro area. Ocean Ranch / Rancho Del Oro are new industrial park developments located approximately 3.5 miles east of San Luis Rey substation and approximately 4 miles west of Melrose substation.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	67	512	194
Non-Labor	103	3,347	14,364
NSE	0	0	0
Total	**170**	**3,859**	**14,558**
FTE	0.7	5.1	1.9

Note: Totals may include rounding differences.

Beginning of Workpaper Group
082530 - Substation 12kV Capacitor Upgrades

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08253.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 5. Substation 12kV Capacitor Upgrades
Workpaper Group: 082530 - Substation 12kV Capacitor Upgrades

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	281	105	339	54	32	173	173	173
Non-Labor	Zero-Based	3,604	1,398	-2,625	158	41	750	750	750
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**3,885**	**1,503**	**-2,286**	**211**	**74**	**923**	**923**	**923**
FTE	Zero-Based	2.5	0.9	2.8	0.5	0.2	1.7	1.7	1.7

Business Purpose:

Improve load power factor at the substations, decrease loading of the distribution transformers to delay future bank additions, decrease loading of the transmission system to delay line and bulk power transformer upgrades, upgrade obsolete equipment, improve transmission voltage profile during heavy load conditions, and improve Customer power quality.

Physical Description:

Adding new banks, replacing obsolete banks, and adding monitoring of substation banks can all contribute greatly to improving the electric system operation by:

• Improving the transmission voltage profile, delaying or eliminating the need for transmission capacitors.

• Greatly improving the Customer power quality by adding capacitors in 4-1800 kVAr steps in place of one 6000 kVAr step.

• Significantly decreasing the apparent power (MVA) loading of the distribution transformers, transmission lines, and bulk power transformers by improving the load power factor, which delays the need for system upgrades.

Adding switched reactor banks can help correct the power factor at the substation. This equipment will help control the reactive power flow at the substation and reduce the transmission voltages under light load conditions.

Project Justification:

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08253.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	5. Substation 12kV Capacitor Upgrades
Workpaper Group:	082530 - Substation 12kV Capacitor Upgrades

Grid Operations identified a reactive power deficiency of 245 MVAr based on the peak load in 2007. This deficiency is primarily due to the poor power factor at the distribution substations. Substation and distribution line capacitors out of service or operating improperly contributed to this situation. Adding new banks, replacing obsolete banks, and adding monitoring of substation banks can all contribute greatly to improving the electric system operation by:
• Improving the transmission voltage profile, delaying or eliminating the need for transmission capacitors.
• Greatly improving the Customer power quality by adding capacitors in 4-1800 kVAr steps in place of one 6000 kVAr step.
• Significantly decreasing the apparent power (MVA) loading of the distribution transformers, transmission lines, and bulk power transformers by improving the load power factor, which delays the need for system upgrades.

Reactive power flow from the 12 kV bus to the transmission system of over 10 MVAr was recorded at twelve substations. This significant reactive power flow into the transmission system is causing voltage regulation problems during light load conditions. Adding switched reactor banks can help correct the power factor at the substation. This equipment will help control the reactive power flow at the substation and reduce the transmission voltages under light load conditions.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08253.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	5. Substation 12kV Capacitor Upgrades
Workpaper Group:	082530 - Substation 12kV Capacitor Upgrades

Forecast Methodology:

Labor - Zero-Based

The forecast method used for Substation 12kV Capacitor Upgrades is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for Substation 12kV Capacitor Upgrades is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08253.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 5. Substation 12kV Capacitor Upgrades
Workpaper Group: 082530 - Substation 12kV Capacitor Upgrades

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	173	173	173	0	0	0	173	173	173
Non-Labor	Zero-Based	750	750	750	0	0	0	750	750	750
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**923**	**923**	**923**	**0**	**0**	**0**	**923**	**923**	**923**
FTE	Zero-Based	1.7	1.7	1.7	0.0	0.0	0.0	1.7	1.7	1.7

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08253.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 5. Substation 12kV Capacitor Upgrades
Workpaper Group: 082530 - Substation 12kV Capacitor Upgrades

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	221	85	281	46	28
Non-Labor	3,250	1,306	-2,527	156	41
NSE	0	0	0	0	0
Total	**3,471**	**1,391**	**-2,246**	**201**	**69**
FTE	2.2	0.8	2.4	0.4	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	221	85	281	46	28
Non-Labor	3,250	1,306	-2,527	156	41
NSE	0	0	0	0	0
Total	**3,471**	**1,391**	**-2,246**	**201**	**69**
FTE	2.2	0.8	2.4	0.4	0.2
Vacation & Sick (Nominal $)					
Labor	32	13	45	7	5
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**32**	**13**	**45**	**7**	**5**
FTE	0.3	0.1	0.4	0.1	0.0
Escalation to 2016$					
Labor	28	7	13	1	0
Non-Labor	354	92	-97	2	0
NSE	0	0	0	0	0
Total	**382**	**99**	**-85**	**3**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	281	105	339	54	32
Non-Labor	3,604	1,398	-2,625	158	41
NSE	0	0	0	0	0
Total	**3,885**	**1,503**	**-2,286**	**211**	**74**
FTE	2.5	0.9	2.8	0.5	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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08253.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 5. Substation 12kV Capacitor Upgrades
Workpaper Group: 082530 - Substation 12kV Capacitor Upgrades

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 082530

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08253.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 5. Substation 12kV Capacitor Upgrades
Workpaper Group: 082530 - Substation 12kV Capacitor Upgrades
Workpaper Detail: 082530.001 - Substation 12kV Capacitor Upgrades

In-Service Date: Not Applicable

Description:

Replace existing single-step capacitor banks at selected substations with banks of increased capacity and multiple steps. Add capacitor banks where the power factor is below minimum requirements. Add capacitor and reactor banks where the power factor is below minimum requirements.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	173	173	173
Non-Labor	750	750	750
NSE	0	0	0
Total	**923**	**923**	**923**
FTE	1.7	1.7	1.7

Note: Totals may include rounding differences.

Beginning of Workpaper Group
08260A - The project requires trenching and installing conduit as well as 1000 kcmil cable along with a PME3

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08260.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 6. C1047 CSW New 12kV Circuit
Workpaper Group: 08260A - The project requires trenching and installing conduit as well as 1000 kcmil cable along with a PME3

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	936	0	0
Non-Labor	Zero-Based	0	0	0	0	0	904	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**1,840**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	9.4	0.0	0.0

Business Purpose:

The project is required to mitigate heavily loaded circuits and substations. To mitigate these heavily loaded circuits, a new circuit is needed to transfer existing load from the heavily loaded circuits to the new circuit.

Physical Description:

The project requires trenching and installing conduit as well as cable along with a PME3 switch and a 4-Way SCADA Trayer switch. Retagging of electric distribution equipment is also planned along with a new hook stick switch.

Project Justification:

Project mitigates a forecasted 95% heavily loaded circuit 166, a forecasted 17% overload on circuit 160 and reduce a forecasted 9% overload on the 3031 bus at Streamview Substation.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08260.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	6. C1047 CSW New 12kV Circuit
Workpaper Group:	08260A - The project requires trenching and installing conduit as well as 1000 kcmil cable along with a PME3

Forecast Methodology:

Labor - Zero-Based

The forecast method used for C1047, CSW: New 12kV Circuit is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for C1047, CSW: New 12kV Circuit is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 08260A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08260.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	6. C1047 CSW New 12kV Circuit
Workpaper Group:	08260A - The project requires trenching and installing conduit as well as 1000 kcmil cable along wit
Workpaper Detail:	08260A.001 - C1047 CSW New 12kV Circuit
In-Service Date:	10/31/2017

Description:

The project requires trenching and installing conduit as well as 1000 kcmil cable along with a PME3 switch and a 4-Way SCADA Trayer switch. Retagging of electric distribution equipment is also planned along with a new hook stick switch.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	936	0	0
Non-Labor	904	0	0
NSE	0	0	0
Total	**1,840**	**0**	**0**
FTE	9.4	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
112560 - C1023 LI New 12kV Circuit & Reconductor C354

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11256.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 7. C1023 LI NEW 12KV CIRCUIT & RECONDUCTOR C354
Workpaper Group: 112560 - C1023 LI New 12kV Circuit & Reconductor C354

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	1,554	0	0
Non-Labor	Zero-Based	0	0	0	0	104	905	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**104**	**2,459**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	15.5	0.0	0.0

Business Purpose:

The purpose of this project is to mitigate existing capacity and reliability limitations, by transferring load from other circuits to the newly constructed circuit. This project contributes to enhancing reliability by creating new ties with existing circuits in the area.

Physical Description:

Project requires installing overhead conductor for the new circuit creating a double circuit pole line with the overloaded circuit 354. The existing circuit 354 will be reconductored as part of the new double pole line. Relocate existing capacitors and retagging of all electric distribution equipment being cutover to the new circuit is part of this project.

Project Justification:

This project is required to reduce a 4% overload on C354 and accommodate additional customer growth. The project will also assist with voltage issues and improve reliability in the area.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11256.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	7. C1023 LI NEW 12KV CIRCUIT & RECONDUCTOR C354
Workpaper Group:	112560 - C1023 LI New 12kV Circuit & Reconductor C354

Forecast Methodology:

Labor - Zero-Based

The forecast method used for C1023, LI: New 12kV Circuit & Reconductor C354 is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for C1023, LI: New 12kV Circuit & Reconductor C354 is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11256.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 7. C1023 LI NEW 12KV CIRCUIT & RECONDUCTOR C354
Workpaper Group: 112560 - C1023 LI New 12kV Circuit & Reconductor C354

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	1,554	0	0	1,554	0	0
Non-Labor	Zero-Based	0	0	0	905	0	0	905	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**2,459**	**0**	**0**	**2,459**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	15.5	0.0	0.0	15.5	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11256.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 7. C1023 LI NEW 12KV CIRCUIT & RECONDUCTOR C354
Workpaper Group: 112560 - C1023 LI New 12kV Circuit & Reconductor C354

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	104
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**104**
FTE	0.0	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	104
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**104**
FTE	0.0	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	104
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**104**
FTE	0.0	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11256.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 7. C1023 LI NEW 12KV CIRCUIT & RECONDUCTOR C354
Workpaper Group: 112560 - C1023 LI New 12kV Circuit & Reconductor C354

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 112560

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11256.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	7. C1023 LI NEW 12KV CIRCUIT & RECONDUCTOR C354
Workpaper Group:	112560 - C1023 LI New 12kV Circuit & Reconductor C354
Workpaper Detail:	112560.001 - C1023 LI NEW 12KV CIRCUIT & RECONDUCTOR C354
In-Service Date:	08/31/2017

Description:

Install 636 ACSR for new circuit 1023 on twin pole line with C354 from substation to P213313. Re-conductor 336.4 ACSR for C354 from P237319 to P213928 in the process. Move capacitor 354-52CF to C1023. Cutover part of C354 from P213313 north over to new C1023. All existing branches on P109253 and beyond will remain on C354.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	1,554	0	0
Non-Labor	905	0	0
NSE	0	0	0
Total	**2,459**	**0**	**0**
FTE	15.5	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
16142A - GRID Modernization

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16142.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 9. GRID Modernization
Workpaper Group: 16142A - GRID Modernization

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	101	0
Non-Labor	Zero-Based	0	0	0	0	0	0	305	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**406**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0

Business Purpose:

The project will cutover load between two existing circuits eliminating an overload and increasing the reliability in the area. The cutover will provide available capacity for future growth in the area and reduces loading on the CAN substation.

Physical Description:

The project requires new trenching and conduit as well as installing new unerground cable and a new PME 10 switch. After the installation, a portion of circuit 783 will be reconfigured and equipment retagged.

Project Justification:

Load growth in the area and new load additions requested by SDG&E customers has resulted in an increase in recorded load as well as a forecasted overload on circuit 783. The increase in load and load additions has result in 14% overload on circuit 783.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16142.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	9. GRID Modernization
Workpaper Group:	16142A - GRID Modernization

Forecast Methodology:

Labor - Zero-Based

The forecast method used for C584, PAR: Extend C584 to offload C783 is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for C584, PAR: Extend C584 to offload C783 is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 16142A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16142.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 9. GRID Modernization
Workpaper Group: 16142A - GRID Modernization
Workpaper Detail: 16142A.001 - GRID Modernization

In-Service Date: Not Applicable

Description:

Project consists of multiple projects. Enhancing the existing SCADA expansion to 4 SCADA switches per circuit, and three WFI locations per circuit.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	101	0
Non-Labor	0	305	0
NSE	0	0	0
Total	**0**	**406**	**0**
FTE	0.0	1.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
162670 - C1447 MTO: EXTENSION & OFFLOAD FROM C958

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16267.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 10. C1447 MTO: Extension and offload from C958
Workpaper Group: 162670 - C1447 MTO: EXTENSION & OFFLOAD FROM C958

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	156	0	0
Non-Labor	Zero-Based	0	0	0	0	0	234	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**390**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0

Business Purpose:

The purpose of this project is to mitigate an overload on circuit 958 and reduce a heavily loaded bus. This will be accomplished by installing extending circuit 1447. This extension will also enhance the reliability in the area and increase the available capacity.

Physical Description:

Project requires installation of a 4 Way SCADA Trayer switch and a padmount SCADA capacitor. The project will also include trenching and installing new conduit as well as underground cable. Retagging of electric distribution equipment is also required after load is transferred.

Project Justification:

The project will mitigate a 100% forecast loading on circuit 958 and a 93% heavily loaded bus at Mesa Rim substation on BK3233.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16267.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	10. C1447 MTO: Extension and offload from C958
Workpaper Group:	162670 - C1447 MTO: EXTENSION & OFFLOAD FROM C958

Forecast Methodology:

Labor - Zero-Based

The forecast method used for C1447, MTO: Extension offloading C958 is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for C1447, MTO: Extension offloading C958 is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16267.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 10. C1447 MTO: Extension and offload from C958
Workpaper Group: 162670 - C1447 MTO: EXTENSION & OFFLOAD FROM C958

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	156	0	0	156	0	0
Non-Labor	Zero-Based	0	0	0	234	0	0	234	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**390**	**0**	**0**	**390**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	1.6	0.0	0.0	1.6	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16267.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 10. C1447 MTO: Extension and offload from C958
Workpaper Group: 162670 - C1447 MTO: EXTENSION & OFFLOAD FROM C958

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16267.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 10. C1447 MTO: Extension and offload from C958
Workpaper Group: 162670 - C1447 MTO: EXTENSION & OFFLOAD FROM C958

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 162670

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16267.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 10. C1447 MTO: Extension and offload from C958
Workpaper Group: 162670 - C1447 MTO: EXTENSION & OFFLOAD FROM C958
Workpaper Detail: 162670.001 - C1447 MTO: Extension and offload from C958

In-Service Date: 08/31/2017

Description:

Project requires installation of a 4 Way SCADA Trayer switch and a padmount SCADA capacitor. The project will also include trenching and installing new 1000 kcmil cable.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	156	0	0
Non-Labor	234	0	0
NSE	0	0	0
Total	**390**	**0**	**0**
FTE	1.6	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
162680 - C1450, MTO:NEW 12 KV CIRCUIT

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16268.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 11. C1450 MTO: NEW 12KV CIRCUIT
Workpaper Group: 162680 - C1450, MTO:NEW 12 KV CIRCUIT

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	541	0
Non-Labor	Zero-Based	0	0	0	0	0	0	678	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**1,219**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	5.4	0.0

Business Purpose:

The purpose of this project is to mitigate an overload and increase the tie capacity in the area. This will be accomplished by installing a new circuit. The new circuit will also enhance the reliability in the area and increase the available capacity.

Physical Description:

Project requires installation of two new SCADA switches, a padmount SCADA capacitor, trenching and installing new conduit as well as installing 1000 kcmil cable. The project also consists of reconfiguring overhead poles from a single run to a twin run and the installation of two new hook sticks. Retagging of electric distribution equipment after load is transferred and a new circuit breaker is also required.

Project Justification:

The new circuit will mitigate a forecasted 17% overload on circuit 961 and increase tie capacity with Mesa Rim and Mirra Sorrento substation.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16268.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	11. C1450 MTO: NEW 12KV CIRCUIT
Workpaper Group:	162680 - C1450, MTO:NEW 12 KV CIRCUIT

Forecast Methodology:

Labor - Zero-Based

The forecast method used for C1450, MTO: New 12kV Circuit is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E utilizes comprehensive cost estimating programs to develop detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for C1450, MTO: New 12kV Circuit is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E utilizes comprehensive cost estimating programs to develop detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16268.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 11. C1450 MTO: NEW 12KV CIRCUIT
Workpaper Group: 162680 - C1450, MTO:NEW 12 KV CIRCUIT

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	541	0	0	541	0
Non-Labor	Zero-Based	0	0	0	0	678	0	0	678	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**1,219**	**0**	**0**	**1,219**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	5.4	0.0	0.0	5.4	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16268.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 11. C1450 MTO: NEW 12KV CIRCUIT
Workpaper Group: 162680 - C1450, MTO:NEW 12 KV CIRCUIT

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16268.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 11. C1450 MTO: NEW 12KV CIRCUIT
Workpaper Group: 162680 - C1450, MTO:NEW 12 KV CIRCUIT

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 162680

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16268.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 11. C1450 MTO: NEW 12KV CIRCUIT
Workpaper Group: 162680 - C1450, MTO:NEW 12 KV CIRCUIT
Workpaper Detail: 162680.001 - C1450 MTO: NEW 12KV CIRCUIT

In-Service Date: 08/31/2018

Description:

Project requires installation of two new SCADA switches a padmount SCADA capacitor, trenching as well as installing 1000 kcmil cable. The project also consists of reconfiguring overhead poles from a single run to a twin run and the installation of two new hook sticks.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	541	0
Non-Labor	0	678	0
NSE	0	0	0
Total	**0**	**1,219**	**0**
FTE	0.0	5.4	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
162690 - JAMACHA NEW BANK & NEW 12KV CIRCUIT

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16269.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 12. JAMACHA NEW BANK & NEW 12KV CIRCUIT
Workpaper Group: 162690 - JAMACHA NEW BANK & NEW 12KV CIRCUIT

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	114	1,348
Non-Labor	Zero-Based	0	0	0	0	0	0	330	3,830
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**444**	**5,178**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	1.1	13.4

Business Purpose:

The purpose of this project is to mitigate an heavily loaded transformer at Jamacha substation and increase the reliability in the area. This will be accomplished by installing new circuit out of Jamacha Substation to balance the load and a new transformer to reduce the loading on the heaviliy loaded transformer.

Physical Description:

Project will require installing undergournd cable utilizing existing conduit in the area. A new four wire pole line along with a Nova SCADA switch as well as a gang operated switch. Retagging of electric distribution equipment is also required after load is transferred. A new 69/12kV transformer will be installed parallelling BK30 as well as a new circuit breaker.

Project Justification:

Project mitigates a 100% heavily loaded bus at Jamacha substation on BK30. The installation of the new transformer will assist with reducing the load on BK3132.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16269.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	12. JAMACHA NEW BANK & NEW 12KV CIRCUIT
Workpaper Group:	162690 - JAMACHA NEW BANK & NEW 12KV CIRCUIT

Forecast Methodology:

Labor - Zero-Based

The forecast method used for JM: New bank and new 12kV Circuit is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for JM: New bank and new 12kV Circuit is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16269.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 12. JAMACHA NEW BANK & NEW 12KV CIRCUIT
Workpaper Group: 162690 - JAMACHA NEW BANK & NEW 12KV CIRCUIT

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	114	1,348	0	114	1,348
Non-Labor	Zero-Based	0	0	0	0	330	3,830	0	330	3,830
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**444**	**5,178**	**0**	**444**	**5,178**
FTE	Zero-Based	0.0	0.0	0.0	0.0	1.1	13.4	0.0	1.1	13.4

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16269.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 12. JAMACHA NEW BANK & NEW 12KV CIRCUIT
Workpaper Group: 162690 - JAMACHA NEW BANK & NEW 12KV CIRCUIT

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16269.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 12. JAMACHA NEW BANK & NEW 12KV CIRCUIT
Workpaper Group: 162690 - JAMACHA NEW BANK & NEW 12KV CIRCUIT

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 162690

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16269.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	12. JAMACHA NEW BANK & NEW 12KV CIRCUIT
Workpaper Group:	162690 - JAMACHA NEW BANK & NEW 12KV CIRCUIT
Workpaper Detail:	162690.001 - JAMACHA NEW BANK & NEW 12KV CIRCUIT
In-Service Date:	01/31/2019

Description:

Project will require installing 1000 kcmil cable for the underground. A new four wire pole line along with a Nova SCADA switch as well as a gang operated switch is planned.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	114	1,348
Non-Labor	0	330	3,830
NSE	0	0	0
Total	**0**	**444**	**5,178**
FTE	0.0	1.1	13.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
162720 - DOHENY DESALINATION 15MW PROJECT

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16272.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 13. DOHENY DESALINATION 15MW PROJECT
Workpaper Group: 162720 - DOHENY DESALINATION 15MW PROJECT

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	366
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**366**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

The purpose of this project is to mitigate capacity limitation because of an alternative service request for the new Doheny Desalination Plant.
This will be accomplished by extending circuit 792.

Physical Description:

Project requires trenching and installing conduit as well as underground cable along with a 4-Way SCADA Trayer switch.
Two gange operated switches and retagging of electric distribution equipment is planned for this project.

Project Justification:

Water authority is requesting additional load and alternative service for their new desalination plant, which will require a reconfiguring and modifications to existing circuits in the area to meet this new demand.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16272.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	13. DOHENY DESALINATION 15MW PROJECT
Workpaper Group:	162720 - DOHENY DESALINATION 15MW PROJECT

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16272.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 13. DOHENY DESALINATION 15MW PROJECT
Workpaper Group: 162720 - DOHENY DESALINATION 15MW PROJECT

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	0	0	0	0	0	366	0	0	366
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**366**	**0**	**0**	**366**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16272.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 13. DOHENY DESALINATION 15MW PROJECT
Workpaper Group: 162720 - DOHENY DESALINATION 15MW PROJECT

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16272.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 13. DOHENY DESALINATION 15MW PROJECT
Workpaper Group: 162720 - DOHENY DESALINATION 15MW PROJECT

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 162720

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16272.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 13. DOHENY DESALINATION 15MW PROJECT
Workpaper Group: 162720 - DOHENY DESALINATION 15MW PROJECT
Workpaper Detail: 162720.001 - DOHENY DESALINATION 15MW PROJECT

In-Service Date: 08/31/2019

Description:

Still Requires Development

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	0
Non-Labor	0	0	366
NSE	0	0	0
Total	**0**	**0**	**366**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
972480 - Distribution System Capacity Improvement

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 97248.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 14. Distribution System Capacity Improvement
Workpaper Group: 972480 - Distribution System Capacity Improvement

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	534	279	246	75	187	264	264	264
Non-Labor	5-YR Average	2,155	1,557	731	1,980	921	1,469	1,469	1,469
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**2,689**	**1,836**	**977**	**2,056**	**1,108**	**1,733**	**1,733**	**1,733**
FTE	5-YR Average	4.1	2.2	2.1	0.6	1.4	2.1	2.1	2.1

Business Purpose:

This blanket budget provides additional capacity on the distribution system in the heavily loaded areas. These areas have highly loaded circuits (>95% loaded) with limited tie capacity and sectionalizing device capabilities. This budget reduces circuit loading and increases tie capacity and sectionalizing capability. It is intended to provide additional capacity and reliability on the distribution system as required by SDG&E Design Standards. Projects identified within this budget are $1M or less with quick turnaround time. Projects identified within this budget can consist of minor modifications to the distribution system to reduce the heavily loaded equipment.

Physical Description:

Construction may include feeder and branch reconductoring, installation of appropriate switches, and other equipment as necessary to increase the capacity of the distribution system for reliability and operating concerns. This project may also be used to install infrastructure for future circuit projects in conjunction with road improvements, transmission system upgrades or other upgrade activities.

Project Justification:

Each project will be evaluated by comparing the potential impact to customer service based on the forecasted or actual load. Projects planned for this budget will be prioritized and recommended accordingly.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	97248.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	14. Distribution System Capacity Improvement
Workpaper Group:	972480 - Distribution System Capacity Improvement

Forecast Methodology:

Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

Non-Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 97248.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 14. Distribution System Capacity Improvement
Workpaper Group: 972480 - Distribution System Capacity Improvement

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	264	264	264	0	0	0	264	264	264
Non-Labor	5-YR Average	1,468	1,468	1,468	1	1	1	1,469	1,469	1,469
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**1,732**	**1,732**	**1,732**	**1**	**1**	**1**	**1,733**	**1,733**	**1,733**
FTE	5-YR Average	2.1	2.1	2.1	0.0	0.0	0.0	2.1	2.1	2.1

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 97248.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 14. Distribution System Capacity Improvement
Workpaper Group: 972480 - Distribution System Capacity Improvement

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	420	225	204	64	160
Non-Labor	1,943	1,454	704	1,953	921
NSE	0	0	0	0	0
Total	**2,364**	**1,679**	**908**	**2,018**	**1,081**
FTE	3.5	1.9	1.8	0.5	1.2
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	420	225	204	64	160
Non-Labor	1,943	1,454	704	1,953	921
NSE	0	0	0	0	0
Total	**2,364**	**1,679**	**908**	**2,018**	**1,081**
FTE	3.5	1.9	1.8	0.5	1.2
Vacation & Sick (Nominal $)					
Labor	61	36	33	10	27
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**61**	**36**	**33**	**10**	**27**
FTE	0.6	0.3	0.3	0.1	0.2
Escalation to 2016$					
Labor	52	18	9	1	0
Non-Labor	212	102	27	27	0
NSE	0	0	0	0	0
Total	**264**	**121**	**36**	**28**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	534	279	246	75	187
Non-Labor	2,155	1,557	731	1,980	921
NSE	0	0	0	0	0
Total	**2,689**	**1,836**	**977**	**2,056**	**1,108**
FTE	4.1	2.2	2.1	0.6	1.4

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 97248.0
Category: A. CAPACITY/EXPANSION
Category-Sub: 14. Distribution System Capacity Improvement
Workpaper Group: 972480 - Distribution System Capacity Improvement

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 972480

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	97248.0
Category:	A. CAPACITY/EXPANSION
Category-Sub:	14. Distribution System Capacity Improvement
Workpaper Group:	972480 - Distribution System Capacity Improvement
Workpaper Detail:	972480.001 - Distribution System Capacity Improvement
In-Service Date:	Not Applicable

Description:

Construction may include new substation banks new circuits feeder and branch reconductoring, installation of appropriate switching, cutover from 4kV to 12kV and other equipment as necessary to increase the capacity of the distribution system for reliability and operating concerns. This project may also be used to install infrastructure for future circuit projects in conjunction with road improvements, transmission system upgrades or other upgrade activities.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	264	264	264
Non-Labor	1,469	1,469	1,469
NSE	0	0	0
Total	**1,733**	**1,733**	**1,733**
FTE	2.1	2.1	2.1

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: B. EQUIP/TOOLS/MISC
Workpaper: 002060

Summary for Category: B. EQUIP/TOOLS/MISC

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	0	0	0	0
Non-Labor	1,376	4,833	2,531	3,029
NSE	0	0	0	0
Total	**1,376**	**4,833**	**2,531**	**3,029**
FTE	0.0	0.0	0.0	0.0

002060 Electric Distribution Tools/Equipment

Labor	0	0	0	0
Non-Labor	1,376	4,833	2,531	3,029
NSE	0	0	0	0
Total	**1,376**	**4,833**	**2,531**	**3,029**
FTE	0.0	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002060 - Electric Distribution Tools/Equipment

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00206.0
Category: B. EQUIP/TOOLS/MISC
Category-Sub: 1. ELECTRIC DISTRIBUTION TOOLS/EQUIPMENT
Workpaper Group: 002060 - Electric Distribution Tools/Equipment

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	3-YR Linear	0	4	1	0	0	0	0	0
Non-Labor	3-YR Linear	2,633	1,146	380	1,356	1,376	4,833	2,531	3,029
NSE	3-YR Linear	0	0	0	0	0	0	0	0
Total		**2,633**	**1,149**	**382**	**1,357**	**1,376**	**4,833**	**2,531**	**3,029**
FTE	3-YR Linear	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

Provide funding for new tools and equipment required by field personnel to inspect, operate and maintain the electric distribution system.

Physical Description:

Provide funding for new tools and equipment required by field personnel to inspect, operate and maintain the electric distribution system.

Project Justification:

Acquisition of standard tools must be conducted to maintain compliance with safety regulations and to ensure the highest productivity levels. Additionally, tools will be purchased for the purpose of evaluating the latest technological advancements.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00206.0
Category:	B. EQUIP/TOOLS/MISC
Category-Sub:	1. ELECTRIC DISTRIBUTION TOOLS/EQUIPMENT
Workpaper Group:	002060 - Electric Distribution Tools/Equipment

Forecast Methodology:

Labor - 3-YR Linear

N/A

Non-Labor - 3-YR Linear

Linear increase annually, with an adjustment for uniforms in 2017

NSE - 3-YR Linear

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00206.0
Category: B. EQUIP/TOOLS/MISC
Category-Sub: 1. ELECTRIC DISTRIBUTION TOOLS/EQUIPMENT
Workpaper Group: 002060 - Electric Distribution Tools/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	3-YR Linear	0	-1	-1	0	1	1	0	0	0
Non-Labor	3-YR Linear	2,033	2,530	3,028	2,800	1	1	4,833	2,531	3,029
NSE	3-YR Linear	0	0	0	0	0	0	0	0	0
Total		**2,033**	**2,529**	**3,027**	**2,800**	**2**	**2**	**4,833**	**2,531**	**3,029**
FTE	3-YR Linear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	1	2,800	0	2,801	0.0	EAMARE20170223113950700
Explanation:	Purchase of Uniforms in second Quarter of 2017						
2017 Total		1	2,800	0	2,801	0.0	
2018	Other	1	0	0	1	0.0	EAMARE20170224133557110
Explanation:	Zero out labor						
2018 Total		1	0	0	1	0.0	
2019	Other	2	0	0	2	0.0	EAMARE20170224133617663
Explanation:	Zero out labor						
2019 Total		2	0	0	2	0.0	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00206.0
Category: B. EQUIP/TOOLS/MISC
Category-Sub: 1. ELECTRIC DISTRIBUTION TOOLS/EQUIPMENT
Workpaper Group: 002060 - Electric Distribution Tools/Equipment

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	3	1	0	0
Non-Labor	2,374	1,070	366	1,338	1,376
NSE	0	0	0	0	0
Total	**2,374**	**1,073**	**367**	**1,338**	**1,376**
FTE	0.0	0.1	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	3	1	0	0
Non-Labor	2,374	1,070	366	1,338	1,376
NSE	0	0	0	0	0
Total	**2,374**	**1,073**	**367**	**1,338**	**1,376**
FTE	0.0	0.1	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	259	75	14	19	0
NSE	0	0	0	0	0
Total	**259**	**76**	**14**	**19**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	4	1	0	0
Non-Labor	2,633	1,146	380	1,356	1,376
NSE	0	0	0	0	0
Total	**2,633**	**1,149**	**382**	**1,357**	**1,376**
FTE	0.0	0.1	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00206.0
Category: B. EQUIP/TOOLS/MISC
Category-Sub: 1. ELECTRIC DISTRIBUTION TOOLS/EQUIPMENT
Workpaper Group: 002060 - Electric Distribution Tools/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 002060

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00206.0
Category: B. EQUIP/TOOLS/MISC
Category-Sub: 1. ELECTRIC DISTRIBUTION TOOLS/EQUIPMENT
Workpaper Group: 002060 - Electric Distribution Tools/Equipment
Workpaper Detail: 002060.001 - ELECTRIC DISTRIBUTION TOOLS/EQUIPMENT

In-Service Date: Not Applicable

Description:

Provide funding for new tools and equipment required by field personnel to inspect, operate and maintain the electric distribution system.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	4,833	2,531	3,029
NSE	0	0	0
Total	**4,833**	**2,531**	**3,029**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: C. FRANCHISE
Workpaper: VARIOUS

Summary for Category: C. FRANCHISE

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	1,616	2,937	3,353	2,987
Non-Labor	19,046	31,526	36,827	32,203
NSE	0	0	0	0
Total	**20,662**	**34,463**	**40,180**	**35,190**
FTE	14.4	32.0	36.2	32.5
001050 ELECTRIC TRANS. STREET/HWY RELOCATIONS				
Labor	87	29	29	29
Non-Labor	375	125	125	125
NSE	0	0	0	0
Total	**462**	**154**	**154**	**154**
FTE	0.1	0.2	0.2	0.2
002050 ELECTRIC DIST. STREET/HWY RELOCATIONS				
Labor	154	354	354	354
Non-Labor	5,099	4,887	4,887	4,887
NSE	0	0	0	0
Total	**5,253**	**5,241**	**5,241**	**5,241**
FTE	1.3	3.2	3.2	3.2
002100 CONVERSION FROM OH TO UG RULE 20A				
Labor	852	1,306	1,306	1,306
Non-Labor	7,863	9,623	9,623	9,623
NSE	0	0	0	0
Total	**8,715**	**10,929**	**10,929**	**10,929**
FTE	7.2	14.1	14.1	14.1
002130 CITY OF SAN DIEGO SURCHARGE PROG (20SD)				
Labor	523	1,248	1,273	1,298
Non-Labor	5,709	16,891	17,226	17,568
NSE	0	0	0	0
Total	**6,232**	**18,139**	**18,499**	**18,866**
FTE	5.8	14.5	14.8	15.0
172500 PACIFIC AVE 20B CONVERSION PHASE 2				
Labor	0	0	162	0
Non-Labor	0	0	2,064	0
NSE	0	0	0	0
Total	**0**	**0**	**2,226**	**0**
FTE	0.0	0.0	1.6	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: C. FRANCHISE
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
172510 ESPOLA RD 20B CONVERSION				
Labor	0	0	155	0
Non-Labor	0	0	1,966	0
NSE	0	0	0	0
Total	**0**	**0**	**2,121**	**0**
FTE	0.0	0.0	1.6	0.0
172520 SOUTH SANTA FE DR 20B CONVERSION PH2				
Labor	0	0	74	0
Non-Labor	0	0	936	0
NSE	0	0	0	0
Total	**0**	**0**	**1,010**	**0**
FTE	0.0	0.0	0.7	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
001050 - ELECTRIC TRANS. STREET/HWY RELOCATIONS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00105.0
Category: C. FRANCHISE
Category-Sub: 1. Electric Trans Street/hwy Relocations
Workpaper Group: 001050 - ELECTRIC TRANS. STREET/HWY RELOCATIONS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	3-YR Average	0	0	0	0	87	29	29	29
Non-Labor	3-YR Average	-3	-162	0	0	375	125	125	125
NSE	3-YR Average	0	0	0	0	0	0	0	0
Total		**-3**	**-162**	**0**	**0**	**462**	**154**	**154**	**154**
FTE	3-YR Average	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2

Business Purpose:

This budget project pro\fldes funds to relocate SDG&E's electri'ic- transmission facilities when requested by various governmental agencies (i.e., Cities, Counties,or the State). The projects requested by government agencies typically are partially or completely billable. The above cost estimates are approximate, actual costs will depend on governmental transmission projects required by City County, and State agencies and payments received from these government agencies.

Physical Description:

2016-2020 Governmental Electric Transmission Relocation Projects

Project Justification:

The work scope, schedule, cash flow, and total cost of each relocation project completed under this budget are substantially controlled by the government agency requesting the relocation and are subject to frequent revisions. As such, the balances of budget project Work Orders and the overall bucfget may not be zero at the end of a particular month or year. Given sufficient time, however, the Work Orders and the budget should reach a zero balance.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00105.0
Category:	C. FRANCHISE
Category-Sub:	1. Electric Trans Street/hwy Relocations
Workpaper Group:	001050 - ELECTRIC TRANS. STREET/HWY RELOCATIONS

Forecast Methodology:

Labor - 3-YR Average

Activities in this budget tend to be the same from year to year, so 3-year average was used to develop the forecast for this project. Also, activities in this area are difficult to anticipate, which makes the average even more appropriate.

Non-Labor - 3-YR Average

Activities in this budget tend to be the same from year to year, so 3-year average was used to develop the forecast for this project. Also, activities in this area are difficult to anticipate, which makes the average even more appropriate.

NSE - 3-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00105.0
Category: C. FRANCHISE
Category-Sub: 1. Electric Trans Street/hwy Relocations
Workpaper Group: 001050 - ELECTRIC TRANS. STREET/HWY RELOCATIONS

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	3-YR Average	28	28	28	1	1	1	29	29	29
Non-Labor	3-YR Average	125	125	125	0	0	0	125	125	125
NSE	3-YR Average	0	0	0	0	0	0	0	0	0
Total		**153**	**153**	**153**	**1**	**1**	**1**	**154**	**154**	**154**
FTE	3-YR Average	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	0	0	0	0	0.2	EAMARE20161201154719443
Explanation:	Adjust FTE to reflect Labor amount						
2017 Total		0	0	0	0	0.2	
2018	Other	0	0	0	0	0.2	EAMARE20161201154730577
Explanation:	Adjust FTE to reflect Labor amount						
2018 Total		0	0	0	0	0.2	
2019	Other	0	0	0	0	0.2	EAMARE20161201154752813
Explanation:	Adjust FTE to reflect Labor amount						
2019 Total		0	0	0	0	0.2	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00105.0
Category: C. FRANCHISE
Category-Sub: 1. Electric Trans Street/hwy Relocations
Workpaper Group: 001050 - ELECTRIC TRANS. STREET/HWY RELOCATIONS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	32
Non-Labor	-2	-152	0	0	173
NSE	0	0	0	0	0
Total	**-2**	**-152**	**0**	**0**	**205**
FTE	0.0	0.0	0.0	0.0	0.1
Adjustments (Nominal $) **					
Labor	0	0	0	0	43
Non-Labor	0	0	0	0	202
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**244**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	0	0	74
Non-Labor	-2	-152	0	0	375
NSE	0	0	0	0	0
Total	**-2**	**-152**	**0**	**0**	**449**
FTE	0.0	0.0	0.0	0.0	0.1
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	12
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**12**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	-11	0	0	0
NSE	0	0	0	0	0
Total	**0**	**-11**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	87
Non-Labor	-3	-162	0	0	375
NSE	0	0	0	0	0
Total	**-3**	**-162**	**0**	**0**	**462**
FTE	0.0	0.0	0.0	0.0	0.1

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00105.0
Category: C. FRANCHISE
Category-Sub: 1. Electric Trans Street/hwy Relocations
Workpaper Group: 001050 - ELECTRIC TRANS. STREET/HWY RELOCATIONS

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	0	0	0	0	43
Non-Labor	0	0	0	0	202
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**244**
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	43	202	0	244	0.0	EAMARE20161107103420800
Explanation:	Adjustment made to reflect actual 2016 spend through the month of Oct-16 and Nov-Dec Q3 Outlook						
2016 Total		43	202	0	244	0.0	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 001050

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00105.0
Category: C. FRANCHISE
Category-Sub: 1. Electric Trans Street/hwy Relocations
Workpaper Group: 001050 - ELECTRIC TRANS. STREET/HWY RELOCATIONS
Workpaper Detail: 001050.001 - Electric Trans Street/hwy Relocations

In-Service Date: Not Applicable

Description:

2016-2020 Governmental Electric Transmission Relocation Projects

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	29	29	29
Non-Labor	125	125	125
NSE	0	0	0
Total	**154**	**154**	**154**
FTE	0.2	0.2	0.2

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002050 - ELECTRIC DIST. STREET/HWY RELOCATIONS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00205.0
Category: C. FRANCHISE
Category-Sub: 2. ELECTRIC DIST. STREET/HWY RELOCATION
Workpaper Group: 002050 - ELECTRIC DIST. STREET/HWY RELOCATIONS

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	335	491	541	249	154	354	354	354
Non-Labor	5-YR Average	8,379	3,453	3,957	3,549	5,099	4,887	4,887	4,887
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**8,714**	**3,944**	**4,498**	**3,798**	**5,253**	**5,241**	**5,241**	**5,241**
FTE	5-YR Average	3.0	4.2	5.2	2.5	1.3	3.2	3.2	3.2

Business Purpose:

This purpose of this budget is to fund relocation of existing distribution facilities for public improvements under the terms of franchise agreements with municipalities, and the provisions of the street and highway codes with respect to state highways. It also funds relocations for MTDB, NCTD, CCDC, and the port of San Diego.

Physical Description:

This budget covers relocations of electric distribution facilities, including both overhead and underground, that are in conflict with public street and highway improvements and other infrastructure improvement projects having rights superior to those of SDG&E.

Project Justification:

This budget is required to fund relocation of existing distribution facilities for public improvements under the terms of franchise agreements with municipalities, and the provisions of the street and highway codes with respect to state highways. It also funds relocations for MTDB, NCTD, CCDC, and the Port of San Diego.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00205.0
Category:	C. FRANCHISE
Category-Sub:	2. ELECTRIC DIST. STREET/HWY RELOCATION
Workpaper Group:	002050 - ELECTRIC DIST. STREET/HWY RELOCATIONS

Forecast Methodology:

Labor - 5-YR Average

Using a 5 year historical average, this budget funds individually designed and planned work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost.

Non-Labor - 5-YR Average

Using a 5 year historical average, this budget funds individually designed and planned work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00205.0
Category: C. FRANCHISE
Category-Sub: 2. ELECTRIC DIST. STREET/HWY RELOCATION
Workpaper Group: 002050 - ELECTRIC DIST. STREET/HWY RELOCATIONS

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	353	353	353	1	1	1	354	354	354
Non-Labor	5-YR Average	4,887	4,887	4,887	0	0	0	4,887	4,887	4,887
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**5,240**	**5,240**	**5,240**	**1**	**1**	**1**	**5,241**	**5,241**	**5,241**
FTE	5-YR Average	3.2	3.2	3.2	0.0	0.0	0.0	3.2	3.2	3.2

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00205.0
Category: C. FRANCHISE
Category-Sub: 2. ELECTRIC DIST. STREET/HWY RELOCATION
Workpaper Group: 002050 - ELECTRIC DIST. STREET/HWY RELOCATIONS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	264	396	449	213	132
Non-Labor	7,556	3,226	3,811	3,500	5,099
NSE	0	0	0	0	0
Total	**7,819**	**3,622**	**4,259**	**3,713**	**5,231**
FTE	2.6	3.6	4.4	2.1	1.1
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	264	396	449	213	132
Non-Labor	7,556	3,226	3,811	3,500	5,099
NSE	0	0	0	0	0
Total	**7,819**	**3,622**	**4,259**	**3,713**	**5,231**
FTE	2.6	3.6	4.4	2.1	1.1
Vacation & Sick (Nominal $)					
Labor	38	63	72	33	22
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**38**	**63**	**72**	**33**	**22**
FTE	0.4	0.6	0.8	0.4	0.2
Escalation to 2016$					
Labor	33	32	20	3	0
Non-Labor	824	227	146	49	0
NSE	0	0	0	0	0
Total	**857**	**260**	**166**	**52**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	335	491	541	249	154
Non-Labor	8,379	3,453	3,957	3,549	5,099
NSE	0	0	0	0	0
Total	**8,714**	**3,944**	**4,498**	**3,798**	**5,253**
FTE	3.0	4.2	5.2	2.5	1.3

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00205.0
Category: C. FRANCHISE
Category-Sub: 2. ELECTRIC DIST. STREET/HWY RELOCATION
Workpaper Group: 002050 - ELECTRIC DIST. STREET/HWY RELOCATIONS

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 002050

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00205.0
Category:	C. FRANCHISE
Category-Sub:	2. ELECTRIC DIST. STREET/HWY RELOCATION
Workpaper Group:	002050 - ELECTRIC DIST. STREET/HWY RELOCATIONS
Workpaper Detail:	002050.001 - ELECTRIC DIST. STREET/HWY RELOCATION
In-Service Date:	Not Applicable

Description:

This budget covers relocations of electric distribution facilities, including both overhead and underground, that are in conflict with public street and highway improvements and other infrastructure improvement projects having rights superior to those of SDG&E.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	354	354	354
Non-Labor	4,887	4,887	4,887
NSE	0	0	0
Total	**5,241**	**5,241**	**5,241**
FTE	3.2	3.2	3.2

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002100 - CONVERSION FROM OH TO UG RULE 20A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00210.0
Category: C. FRANCHISE
Category-Sub: 3. CONVERSION FROM OH TO UG RULE 20A
Workpaper Group: 002100 - CONVERSION FROM OH TO UG RULE 20A

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	1,633	1,806	1,126	1,114	852	1,306	1,306	1,306
Non-Labor	5-YR Average	12,016	11,616	7,284	9,335	7,863	9,623	9,623	9,623
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**13,650**	**13,422**	**8,411**	**10,449**	**8,715**	**10,929**	**10,929**	**10,929**
FTE	5-YR Average	16.8	23.3	11.8	11.5	7.2	14.1	14.1	14.1

Business Purpose:

Convert overhead facilities to underground based on requirements of our conversion rule 20a; a CPUC mandated program defined in case 8209 dated 09-27-67, and effective 01-01-68, and franchise agreements with the cities of San Diego and Chula Vista. The significant other customers that participate in the program are the cities of: Carlsbad, Coronado, Dana Point, Del Mar, El Cajon, Encinitas, Escondido, Imperial Beach, Laguna Beach, Laguna Hills, Laguna Niguel, La Mesa,Lemon Grove, Mission Viejo, National City, Oceanside, Poway, Solana Beach, San Clemente, San Juan Capistrano, San Marcos, Santee And The Counties Of Orange And San Diego

Physical Description:

This budget provides for, at the utility's expense, replacement of existing overhead electric facilities with new comparable underground electric facilities. Replacement is effected at the request of the governing body in the city or county in which such electric facilities are located. This is provided that the conversion area selected by the governing body meets the criteria as set forth in Rule 20A.

Project Justification:

This is a CPUC mandated program and is also incorporated into the SDG&E Franchises with the cities of San Diego and Chula Vista. Total program allocations (e.g., promises to spend) are based on the San Diego Agreement, with each other City/County receiving an amount proportional to their electric meter count in accordance with the methodology specified in Rule 20A. Expenditures in San Diego are also mandated by the MOU.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00210.0
Category:	C. FRANCHISE
Category-Sub:	3. CONVERSION FROM OH TO UG RULE 20A
Workpaper Group:	002100 - CONVERSION FROM OH TO UG RULE 20A

Forecast Methodology:

Labor - 5-YR Average

Using a 5 year historical average, this budget funds individually designed and planned conversion work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with local municipalities in scheduling and prioritizing projects according to annual allocations, available funds, and a variety of other factors affecting scope and schedule.

Non-Labor - 5-YR Average

Using a 5 year historical average, this budget funds individually designed and planned conversion work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with local municipalities in scheduling and prioritizing projects according to annual allocations, available funds, and a variety of other factors affecting scope and schedule.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00210.0
Category: C. FRANCHISE
Category-Sub: 3. CONVERSION FROM OH TO UG RULE 20A
Workpaper Group: 002100 - CONVERSION FROM OH TO UG RULE 20A

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	1,306	1,306	1,306	0	0	0	1,306	1,306	1,306
Non-Labor	5-YR Average	9,623	9,623	9,623	0	0	0	9,623	9,623	9,623
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**10,929**	**10,929**	**10,929**	**0**	**0**	**0**	**10,929**	**10,929**	**10,929**
FTE	5-YR Average	14.1	14.1	14.1	0.0	0.0	0.0	14.1	14.1	14.1

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00210.0
Category: C. FRANCHISE
Category-Sub: 3. CONVERSION FROM OH TO UG RULE 20A
Workpaper Group: 002100 - CONVERSION FROM OH TO UG RULE 20A

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	1,286	1,456	935	952	731
Non-Labor	10,835	10,852	7,015	9,207	7,863
NSE	0	0	0	0	0
Total	**12,121**	**12,308**	**7,950**	**10,159**	**8,594**
FTE	14.5	19.8	10.0	9.8	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	1,286	1,456	935	952	731
Non-Labor	10,835	10,852	7,015	9,207	7,863
NSE	0	0	0	0	0
Total	**12,121**	**12,308**	**7,950**	**10,159**	**8,594**
FTE	14.5	19.8	10.0	9.8	6.1
Vacation & Sick (Nominal $)					
Labor	186	231	149	147	121
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**186**	**231**	**149**	**147**	**121**
FTE	2.3	3.5	1.8	1.7	1.1
Escalation to 2016$					
Labor	161	119	42	15	0
Non-Labor	1,181	764	270	128	0
NSE	0	0	0	0	0
Total	**1,342**	**883**	**311**	**143**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	1,633	1,806	1,126	1,114	852
Non-Labor	12,016	11,616	7,284	9,335	7,863
NSE	0	0	0	0	0
Total	**13,650**	**13,422**	**8,411**	**10,449**	**8,715**
FTE	16.8	23.3	11.8	11.5	7.2

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00210.0
Category: C. FRANCHISE
Category-Sub: 3. CONVERSION FROM OH TO UG RULE 20A
Workpaper Group: 002100 - CONVERSION FROM OH TO UG RULE 20A

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 002100

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00210.0
Category:	C. FRANCHISE
Category-Sub:	3. CONVERSION FROM OH TO UG RULE 20A
Workpaper Group:	002100 - CONVERSION FROM OH TO UG RULE 20A
Workpaper Detail:	002100.001 - CONVERSION FROM OH TO UG RULE 20A
In-Service Date:	Not Applicable

Description:

This budget provides for at the utility s expense replacement of existing overhead electric facilities with new comparable underground electric facilities. Replacement is effected at the request of the governing body in the city or county in which such electric facilities are located. This is provided that the conversion area selected by the governing body meets the criteria as set forth in Rule 20A.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1,306	1,306	1,306
Non-Labor	9,623	9,623	9,623
NSE	0	0	0
Total	**10,929**	**10,929**	**10,929**
FTE	14.1	14.1	14.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002130 - CITY OF SAN DIEGO SURCHARGE PROG (20SD)

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00213.0
Category: C. FRANCHISE
Category-Sub: 4. CITY OF SD SURCHARGE PROG (20SD)- COLLECTIBLE
Workpaper Group: 002130 - CITY OF SAN DIEGO SURCHARGE PROG (20SD)

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	763	1,054	1,138	1,610	523	1,248	1,273	1,298
Non-Labor	5-YR Average	18,740	15,738	16,834	17,262	5,709	16,891	17,226	17,568
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**19,502**	**16,792**	**17,971**	**18,872**	**6,232**	**18,139**	**18,499**	**18,866**
FTE	5-YR Average	9.4	10.5	15.8	19.3	5.8	14.5	14.8	15.0

Business Purpose:

The purpose of this Program is unique to the City of San Diego. The City's goal is to underground, as much as possible, existing electric distribution and transmission facilities within the bounds of the City's territory.

Physical Description:

This Program, provided for at the City of San Diego's expense, replaces existing overhead electric facilities with comparable new underground electric facilities (transmission and distribution). Replacement is effected at the request of San Diego. This is a separate and distinct Program from and unrelated to the Rule 20A Undergrounding Program.

Project Justification:

This Program is associated with SDG&E Franchise Agreement with the City of San Diego and is required by that Agreement. All expenses associated with this Program will be reimbursed to SDG&E by the City from the proceeds of a surcharge collected from each electric meter account in the City of San Diego. No net capital or O&M expenditures are anticipated.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00213.0
Category:	C. FRANCHISE
Category-Sub:	4. CITY OF SD SURCHARGE PROG (20SD)- COLLECTIBLE
Workpaper Group:	002130 - CITY OF SAN DIEGO SURCHARGE PROG (20SD)

Forecast Methodology:

Labor - 5-YR Average

Using a 5 year historical average, this budget funds individually designed and planned conversion work orders, exclusive to the City of San Diego Surcharge Program, using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with the City of San Diego in scheduling and prioritizing projects according to the City of San Diego Master Plan, coordination with planned 20A conversions, and a variety of other factors affecting scope and schedule.

Non-Labor - 5-YR Average

Using a 5 year historical average, this budget funds individually designed and planned conversion work orders, exclusive to the City of San Diego Surcharge Program, using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with the City of San Diego in scheduling and prioritizing projects according to the City of San Diego Master Plan, coordination with planned 20A conversions, and a variety of other factors affecting scope and schedule.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00213.0
Category: C. FRANCHISE
Category-Sub: 4. CITY OF SD SURCHARGE PROG (20SD)- COLLECTIBLE
Workpaper Group: 002130 - CITY OF SAN DIEGO SURCHARGE PROG (20SD)

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	1,017	1,017	1,017	231	256	281	1,248	1,273	1,298
Non-Labor	5-YR Average	14,856	14,856	14,856	2,035	2,370	2,712	16,891	17,226	17,568
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**15,873**	**15,873**	**15,873**	**2,266**	**2,626**	**2,993**	**18,139**	**18,499**	**18,866**
FTE	5-YR Average	12.2	12.2	12.2	2.3	2.6	2.8	14.5	14.8	15.0

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	231	2,034	0	2,265	2.3	EAMARE20161205162659557
Explanation:	5YR average + forecast						
2017 Total		231	2,034	0	2,265	2.3	
2018	Other	256	2,369	0	2,625	2.6	EAMARE20161205162733530
Explanation:	5YR average + forecast						
2018 Total		256	2,369	0	2,625	2.6	
2019	Other	281	2,711	0	2,992	2.8	EAMARE20161205162810413
Explanation:	5YR average + forecast						
2019 Total		281	2,711	0	2,992	2.8	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00213.0
Category: C. FRANCHISE
Category-Sub: 4. CITY OF SD SURCHARGE PROG (20SD)- COLLECTIBLE
Workpaper Group: 002130 - CITY OF SAN DIEGO SURCHARGE PROG (20SD)

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	601	850	945	1,376	449
Non-Labor	16,897	14,703	16,211	17,026	5,709
NSE	0	0	0	0	0
Total	**17,498**	**15,552**	**17,156**	**18,401**	**6,158**
FTE	8.1	8.9	13.4	16.4	4.9
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	601	850	945	1,376	449
Non-Labor	16,897	14,703	16,211	17,026	5,709
NSE	0	0	0	0	0
Total	**17,498**	**15,552**	**17,156**	**18,401**	**6,158**
FTE	8.1	8.9	13.4	16.4	4.9
Vacation & Sick (Nominal $)					
Labor	87	135	151	212	74
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**87**	**135**	**151**	**212**	**74**
FTE	1.3	1.6	2.4	2.9	0.9
Escalation to 2016$					
Labor	75	69	42	22	0
Non-Labor	1,842	1,036	623	236	0
NSE	0	0	0	0	0
Total	**1,917**	**1,105**	**665**	**259**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	763	1,054	1,138	1,610	523
Non-Labor	18,740	15,738	16,834	17,262	5,709
NSE	0	0	0	0	0
Total	**19,502**	**16,792**	**17,971**	**18,872**	**6,232**
FTE	9.4	10.5	15.8	19.3	5.8

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00213.0
Category: C. FRANCHISE
Category-Sub: 4. CITY OF SD SURCHARGE PROG (20SD)- COLLECTIBLE
Workpaper Group: 002130 - CITY OF SAN DIEGO SURCHARGE PROG (20SD)

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 002130

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00213.0
Category:	C. FRANCHISE
Category-Sub:	4. CITY OF SD SURCHARGE PROG (20SD)- COLLECTIBLE
Workpaper Group:	002130 - CITY OF SAN DIEGO SURCHARGE PROG (20SD)
Workpaper Detail:	002130.002 - CITY OF SAN DIEGO SURCHARGE PROG (20SD)- COLLECTIBLE
In-Service Date:	Not Applicable

Description:

This Program provided for at the City of San Diego s expense, replaces existing overhead electric facilities with comparable new underground electric facilities (transmission and distribution). Replacement is effected at the request of San Diego. This is a separate and distinct Program from and unrelated to the Rule 20A Undergrounding Program.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	1,248	1,273	1,298
Non-Labor	16,891	17,226	17,568
NSE	0	0	0
Total	**18,139**	**18,499**	**18,866**
FTE	14.5	14.8	15.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
172500 - PACIFIC AVE 20B CONVERSION PHASE 2

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17250.0
Category: C. FRANCHISE
Category-Sub: 5. Pacific Ave 20B Conversion Phase 2
Workpaper Group: 172500 - PACIFIC AVE 20B CONVERSION PHASE 2

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	162	0
Non-Labor	Zero-Based	0	0	0	0	0	0	2,064	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**2,226**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0

Business Purpose:

Convert overhead electric distribution lines with an equivalent underground electric distribution system as stipulated by the requirements of Rule 20B; the criteria for Rule 20B are typically applied when a project is not eligible for Rule 20A; Rule 20B allows rate funds to subsidize an undergrounding project but not to the extent as when 20A criteria apply; subsidies include an amount equal to the cost of an equivalent overhead electric system as well as the cost of removing the existing overhead system.

Physical Description:

This budget provides for the utility's portion of expenses associated with the replacement of existing overhead electric facilities with new comparable underground electric facilities as they relate to a specifically municipal-requested undergrounding project. Replacement is effected at the request of the governing body in the city or county in which such electric facilities are located. The conversion area selected by the governing body meets the criteria as set forth in Rule 20B.

Project Justification:

This is a CPUC mandated program which offers an alternative to funding underground conversions when criteria for Rule 20A cannot be met. Rule 20B projects must be mutually agreed upon by the applicant organization and the utility.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17250.0
Category:	C. FRANCHISE
Category-Sub:	5. Pacific Ave 20B Conversion Phase 2
Workpaper Group:	172500 - PACIFIC AVE 20B CONVERSION PHASE 2

Forecast Methodology:

Labor - Zero-Based

Rule 20B projects that are municipally-driven are intended to be individual projects as as opposed to widespread systemic application; funding by a local government is typically supported by community involvement and are thus less common. This budget funds the utility's portion of individually designed and planned conversion work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with local municipalities in scheduling and prioritizing projects according to available funds, community support, and a variety of other factors affecting scope and schedule.

Non-Labor - Zero-Based

Rule 20B projects that are municipally-driven are intended to be individual projects as as opposed to widespread systemic application; funding by a local government is typically supported by community involvement and are thus less common. This budget funds the utility's portion of individually designed and planned conversion work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with local municipalities in scheduling and prioritizing projects according to available funds, community support, and a variety of other factors affecting scope and schedule.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17250.0
Category: C. FRANCHISE
Category-Sub: 5. Pacific Ave 20B Conversion Phase 2
Workpaper Group: 172500 - PACIFIC AVE 20B CONVERSION PHASE 2

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	162	0	0	162	0
Non-Labor	Zero-Based	0	0	0	0	2,064	0	0	2,064	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**2,226**	**0**	**0**	**2,226**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	1.6	0.0	0.0	1.6	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17250.0
Category: C. FRANCHISE
Category-Sub: 5. Pacific Ave 20B Conversion Phase 2
Workpaper Group: 172500 - PACIFIC AVE 20B CONVERSION PHASE 2

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17250.0
Category: C. FRANCHISE
Category-Sub: 5. Pacific Ave 20B Conversion Phase 2
Workpaper Group: 172500 - PACIFIC AVE 20B CONVERSION PHASE 2

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 172500

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17250.0
Category:	C. FRANCHISE
Category-Sub:	5. Pacific Ave 20B Conversion Phase 2
Workpaper Group:	172500 - PACIFIC AVE 20B CONVERSION PHASE 2
Workpaper Detail:	172500.001 - Pacific Ave 20B Conversion Phase 2
In-Service Date:	06/30/2018

Description:

Pacific Ave 20B Conversion Phase 2

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	162	0
Non-Labor	0	2,064	0
NSE	0	0	0
Total	**0**	**2,226**	**0**
FTE	0.0	1.6	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
172510 - ESPOLA RD 20B CONVERSION

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17251.0
Category: C. FRANCHISE
Category-Sub: 6. Espola Rd 20B Conversion
Workpaper Group: 172510 - ESPOLA RD 20B CONVERSION

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	155	0
Non-Labor	Zero-Based	0	0	0	0	0	0	1,966	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**2,121**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0

Business Purpose:

Convert overhead electric distribution lines with an equivalent underground electric distribution system as stipulated by the requirements of Rule 20B; the criteria for Rule 20B are typically applied when a project is not eligible for Rule 20A; Rule 20B allows rate funds to subsidize an undergrounding project but not to the extent as when 20A criteria apply; subsidies include an amount equal to the cost of an equivalent overhead electric system as well as the cost of removing the existing overhead system.

Physical Description:

This budget provides for the utility's portion of expenses associated with the replacement of existing overhead electric facilities with new comparable underground electric facilities as they relate to a specifically municipal-requested undergrounding project. Replacement is effected at the request of the governing body in the city or county in which such electric facilities are located. The conversion area selected by the governing body meets the criteria as set forth in Rule 20B.

Project Justification:

This is a CPUC mandated program which offers an alternative to funding underground conversions when criteria for Rule 20A cannot be met. Rule 20B projects must be mutually agreed upon by the applicant organization and the utility.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17251.0
Category:	C. FRANCHISE
Category-Sub:	6. Espola Rd 20B Conversion
Workpaper Group:	172510 - ESPOLA RD 20B CONVERSION

Forecast Methodology:

Labor - Zero-Based

Rule 20B projects that are municipally-driven are intended to be individual projects as as opposed to widespread systemic application; funding by a local government is typically supported by community involvement and are thus less common. This budget funds the utility's portion of individually designed and planned conversion work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with local municipalities in scheduling and prioritizing projects according to available funds, community support, and a variety of other factors affecting scope and schedule.

Non-Labor - Zero-Based

Rule 20B projects that are municipally-driven are intended to be individual projects as as opposed to widespread systemic application; funding by a local government is typically supported by community involvement and are thus less common. This budget funds the utility's portion of individually designed and planned conversion work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with local municipalities in scheduling and prioritizing projects according to available funds, community support, and a variety of other factors affecting scope and schedule.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17251.0
Category: C. FRANCHISE
Category-Sub: 6. Espola Rd 20B Conversion
Workpaper Group: 172510 - ESPOLA RD 20B CONVERSION

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	155	0	0	155	0
Non-Labor	Zero-Based	0	0	0	0	1,966	0	0	1,966	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**2,121**	**0**	**0**	**2,121**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	1.6	0.0	0.0	1.6	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17251.0
Category: C. FRANCHISE
Category-Sub: 6. Espola Rd 20B Conversion
Workpaper Group: 172510 - ESPOLA RD 20B CONVERSION

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17251.0
Category: C. FRANCHISE
Category-Sub: 6. Espola Rd 20B Conversion
Workpaper Group: 172510 - ESPOLA RD 20B CONVERSION

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 172510

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17251.0
Category:	C. FRANCHISE
Category-Sub:	6. Espola Rd 20B Conversion
Workpaper Group:	172510 - ESPOLA RD 20B CONVERSION
Workpaper Detail:	172510.001 - Espola Rd 20B Conversion
In-Service Date:	06/30/2018

Description:

Espola Rd 20B Conversion

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	155	0
Non-Labor	0	1,966	0
NSE	0	0	0
Total	**0**	**2,121**	**0**
FTE	0.0	1.6	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
172520 - SOUTH SANTA FE DR 20B CONVERSION PH2

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17252.0
Category: C. FRANCHISE
Category-Sub: 7. South Santa Fe Dr 20B Conversion Phase 2
Workpaper Group: 172520 - SOUTH SANTA FE DR 20B CONVERSION PH2

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	74	0
Non-Labor	Zero-Based	0	0	0	0	0	0	936	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**1,010**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0

Business Purpose:

Convert overhead electric distribution lines with an equivalent underground electric distribution system as stipulated by the requirements of Rule 20B; the criteria for Rule 20B are typically applied when a project is not eligible for Rule 20A; Rule 20B allows rate funds to subsidize an undergrounding project but not to the extent as when 20A criteria apply; subsidies include an amount equal to the cost of an equivalent overhead electric system as well as the cost of removing the existing overhead system.

Physical Description:

This budget provides for the utility's portion of expenses associated with the replacement of existing overhead electric facilities with new comparable underground electric facilities as they relate to a specifically municipal-requested undergrounding project. Replacement is effected at the request of the governing body in the city or county in which such electric facilities are located. The conversion area selected by the governing body meets the criteria as set forth in Rule 20B.

Project Justification:

This is a CPUC mandated program which offers an alternative to funding underground conversions when criteria for Rule 20A cannot be met. Rule 20B projects must be mutually agreed upon by the applicant organization and the utility.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17252.0
Category:	C. FRANCHISE
Category-Sub:	7. South Santa Fe Dr 20B Conversion Phase 2
Workpaper Group:	172520 - SOUTH SANTA FE DR 20B CONVERSION PH2

Forecast Methodology:

Labor - Zero-Based

Rule 20B projects that are municipally-driven are intended to be individual projects as as opposed to widespread systemic application; funding by a local government is typically supported by community involvement and are thus less common. This budget funds the utility's portion of individually designed and planned conversion work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with local municipalities in scheduling and prioritizing projects according to available funds, community support, and a variety of other factors affecting scope and schedule.

Non-Labor - Zero-Based

Rule 20B projects that are municipally-driven are intended to be individual projects as as opposed to widespread systemic application; funding by a local government is typically supported by community involvement and are thus less common. This budget funds the utility's portion of individually designed and planned conversion work orders using established SDG&E standards and processes so that the resulting infrastructure is reliable and completed for the lowest reasonable cost. SDG&E coordinates closely with local municipalities in scheduling and prioritizing projects according to available funds, community support, and a variety of other factors affecting scope and schedule.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17252.0
Category: C. FRANCHISE
Category-Sub: 7. South Santa Fe Dr 20B Conversion Phase 2
Workpaper Group: 172520 - SOUTH SANTA FE DR 20B CONVERSION PH2

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	74	0	0	74	0
Non-Labor	Zero-Based	0	0	0	0	936	0	0	936	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**1,010**	**0**	**0**	**1,010**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.7	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17252.0
Category: C. FRANCHISE
Category-Sub: 7. South Santa Fe Dr 20B Conversion Phase 2
Workpaper Group: 172520 - SOUTH SANTA FE DR 20B CONVERSION PH2

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17252.0
Category: C. FRANCHISE
Category-Sub: 7. South Santa Fe Dr 20B Conversion Phase 2
Workpaper Group: 172520 - SOUTH SANTA FE DR 20B CONVERSION PH2

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 172520

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17252.0
Category:	C. FRANCHISE
Category-Sub:	7. South Santa Fe Dr 20B Conversion Phase 2
Workpaper Group:	172520 - SOUTH SANTA FE DR 20B CONVERSION PH2
Workpaper Detail:	172520.001 - South Santa Fe Dr 20B Conversion Phase 2
In-Service Date:	04/30/2018

Description:

South Santa Fe Dr 20B Conversion Phase 2

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	74	0
Non-Labor	0	936	0
NSE	0	0	0
Total	**0**	**1,010**	**0**
FTE	0.0	0.7	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: D. MANDATED
Workpaper: VARIOUS

Summary for Category: D. MANDATED

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	13,378	10,768	11,488	10,738
Non-Labor	22,179	22,401	22,889	21,924
NSE	0	0	0	0
Total	**35,557**	**33,169**	**34,377**	**32,662**
FTE	107.0	89.9	97.1	89.6
001020 ELEC TRANS LINE RELOCATION PROJECTS				
Labor	20	7	7	7
Non-Labor	88	32	32	32
NSE	0	0	0	0
Total	**108**	**39**	**39**	**39**
FTE	0.1	0.1	0.1	0.1
002290 RAMP Base - CORRECTIVE MAINTENANCE PROGRAM (CMP)				
Labor	6,690	5,321	5,321	5,321
Non-Labor	5,949	5,482	5,482	5,482
NSE	0	0	0	0
Total	**12,639**	**10,803**	**10,803**	**10,803**
FTE	53.5	44.7	44.7	44.7
002890 CMP UG Switch Replacement & Manhole Repair				
Labor	1,008	767	767	767
Non-Labor	5,470	4,671	4,671	4,671
NSE	0	0	0	0
Total	**6,478**	**5,438**	**5,438**	**5,438**
FTE	5.9	4.9	4.9	4.9
062470 Replacement Of Live Front Equipment				
Labor	55	73	73	73
Non-Labor	460	612	612	612
NSE	0	0	0	0
Total	**515**	**685**	**685**	**685**
FTE	0.4	0.7	0.7	0.7
102650 Avian Protection				
Labor	92	454	454	454
Non-Labor	8	1,181	1,181	1,181
NSE	0	0	0	0
Total	**100**	**1,635**	**1,635**	**1,635**
FTE	1.1	4.5	4.5	4.5

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: D. MANDATED
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
11144A 13270 C1162 BD: New 12kV Circuit				
Labor	0	0	654	0
Non-Labor	0	0	602	0
NSE	0	0	0	0
Total	**0**	**0**	**1,256**	**0**
FTE	0.0	0.0	6.5	0.0
132640 DISTRIBUTED GENERATION INTERCONNECT. PRO				
Labor	45	30	96	0
Non-Labor	208	477	363	0
NSE	0	0	0	0
Total	**253**	**507**	**459**	**0**
FTE	0.4	0.3	1.0	0.0
872320 Pole Replacement And Reinforcement - RAMP				
Labor	5,468	4,019	4,019	4,019
Non-Labor	9,996	9,924	9,924	9,924
NSE	0	0	0	0
Total	**15,464**	**13,943**	**13,943**	**13,943**
FTE	45.6	33.9	33.9	33.9
13266A AERIAL MARKING FOR SAFETY				
Labor	0	97	97	97
Non-Labor	0	22	22	22
NSE	0	0	0	0
Total	**0**	**119**	**119**	**119**
FTE	0.0	0.8	0.8	0.8

Note: Totals may include rounding differences.

Beginning of Workpaper Group
001020 - ELEC TRANS LINE RELOCATION PROJECTS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00102.0
Category: D. MANDATED
Category-Sub: 1. ELEC TRANS LINE RELOCATION PROJECTS
Workpaper Group: 001020 - ELEC TRANS LINE RELOCATION PROJECTS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	3-YR Average	2	1	0	0	20	7	7	7
Non-Labor	3-YR Average	0	3	7	0	88	32	32	32
NSE	3-YR Average	0	0	0	0	0	0	0	0
Total		**2**	**4**	**7**	**0**	**107**	**39**	**39**	**39**
FTE	3-YR Average	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1

Business Purpose:

The Budget provides a holding fund for payments received from developers or agencies for requested relocations of SDG&E electric transmission facilities. All funding for Work Orders to be completed under this budget will be provided by the developer/agency requesting the relocation. All funds not expended will be returned to the appropriate developer/agency upon completion of each project and close out of the associated Work Orders.

Physical Description:

Electric transmission relocation projects

Project Justification:

The work scope, schedule, cash flow, and total cost of each relocation project completed under this budget project are substantially controlled by the develop/agency requesting the relocation and are subject to frequent revisions. As such, the balances of budget project Work Orders and the overall budget may not be zero at the end of a particular month or year. Given sufficient time, however, the Work Orders and the budget should reach a zero balance.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00102.0
Category:	D. MANDATED
Category-Sub:	1. ELEC TRANS LINE RELOCATION PROJECTS
Workpaper Group:	001020 - ELEC TRANS LINE RELOCATION PROJECTS

Forecast Methodology:

Labor - 3-YR Average

Activities in this budget tend to be the same from year to year, so 3-year average was used to develop the forecast for this project. Also, activities in this area are difficult to anticipate, which makes the average even more appropriate.

Non-Labor - 3-YR Average

Activities in this budget tend to be the same from year to year, so 3-year average was used to develop the forecast for this project. Also, activities in this area are difficult to anticipate, which makes the average even more appropriate.

NSE - 3-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00102.0
Category: D. MANDATED
Category-Sub: 1. ELEC TRANS LINE RELOCATION PROJECTS
Workpaper Group: 001020 - ELEC TRANS LINE RELOCATION PROJECTS

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	3-YR Average	6	6	6	1	1	1	7	7	7
Non-Labor	3-YR Average	31	31	31	1	1	1	32	32	32
NSE	3-YR Average	0	0	0	0	0	0	0	0	0
Total		**37**	**37**	**37**	**2**	**2**	**2**	**39**	**39**	**39**
FTE	3-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	EAMARE20161201154157960
Explanation:	Adjust FTE to reflect labor amount						
2017 Total		0	0	0	0	0.1	
2018	Other	0	0	0	0	0.1	EAMARE20161201154230303
Explanation:	Adjust FTE to reflect Labour amount						
2018 Total		0	0	0	0	0.1	
2019	Other	0	0	0	0	0.1	EAMARE20161201154241957
Explanation:	Adjust FTE to reflect Labour amount						
2019 Total		0	0	0	0	0.1	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00102.0
Category: D. MANDATED
Category-Sub: 1. ELEC TRANS LINE RELOCATION PROJECTS
Workpaper Group: 001020 - ELEC TRANS LINE RELOCATION PROJECTS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	2	1	0	0	17
Non-Labor	0	3	7	0	88
NSE	0	0	0	0	0
Total	**2**	**4**	**7**	**0**	**104**
FTE	0.0	0.0	0.0	0.0	0.1
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	2	1	0	0	17
Non-Labor	0	3	7	0	88
NSE	0	0	0	0	0
Total	**2**	**4**	**7**	**0**	**104**
FTE	0.0	0.0	0.0	0.0	0.1
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	3
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**3**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
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	2	1	0	0	20
Non-Labor	0	3	7	0	88
NSE	0	0	0	0	0
Total	**2**	**4**	**7**	**0**	**107**
FTE	0.0	0.0	0.0	0.0	0.1

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00102.0
Category: D. MANDATED
Category-Sub: 1. ELEC TRANS LINE RELOCATION PROJECTS
Workpaper Group: 001020 - ELEC TRANS LINE RELOCATION PROJECTS

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 001020

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00102.0
Category: D. MANDATED
Category-Sub: 1. ELEC TRANS LINE RELOCATION PROJECTS
Workpaper Group: 001020 - ELEC TRANS LINE RELOCATION PROJECTS
Workpaper Detail: 001020.001 - ELEC TRANS LINE RELOCATION PROJECTS

In-Service Date: Not Applicable

Description:

Electric transmission relocation projects

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	7	7	7
Non-Labor	32	32	32
NSE	0	0	0
Total	**39**	**39**	**39**
FTE	0.1	0.1	0.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002290 - RAMP Base - CORRECTIVE MAINTENANCE PROGRAM (CMP)

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00229.0
Category: D. MANDATED
Category-Sub: 2. CORRECTIVE MAINT PROGRAM
Workpaper Group: 002290 - RAMP Base - CORRECTIVE MAINTENANCE PROGRAM (CMP)

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	4,939	4,347	4,760	5,867	6,690	5,321	5,321	5,321
Non-Labor	5-YR Average	5,661	4,736	5,090	5,973	5,949	5,482	5,482	5,482
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**10,600**	**9,083**	**9,850**	**11,839**	**12,639**	**10,803**	**10,803**	**10,803**
FTE	5-YR Average	41.5	37.4	40.8	50.1	53.5	44.7	44.7	44.7

Business Purpose:

In lieu of the existing progarm in place, short and long term deterioration of underground equipment could increase likelihood of asset failure (e.g. broken cable rack) and cause potential risks, including injury or death, to the public and workers. Degraded equipment would also increase volume and frequency of forced distribution outages, creating risks for public safety. As this program is mandated per GO 165, non-compliance poses risk of regulatory action, including fines. Underground connectors are inspected by infrared technology per ESP 120 (upon entry of facility) and replaced accordingly.

Physical Description:

"All electric distribution facilities are visually patrolled on an annual basis in urban and rural areas and inspected in detail every three, five, or ten years depending on equipment type. Conditions found during the inspections may require only labor to repair equipment or may require replacement of equipment that is no longer serviceable. Inspections and some repair work are captured under O&M budgets. There are approximately 230,000 overhead poles and 154,000 underground facilities to inspect on the following cycles:
Equipment Inspection Type Cycle
Overhead Detail 5 years
Above Ground Internal 5 years
Above Ground External 5 years
Subsurface 3 year 3 years
Subsurface 10 year 10 years
Oil & Gas Switches 3 years (replacements on 00289 budget)
Wood Pole Integrity 10/15/20 years (replacements and restoration on 87232 budget)"

Project Justification:

"This program is mandated by the CPUC. It is also incumbent on SDG&E to ensure a safe environment for workers and the public and to provide reliable service. Failure to perform the inspections and repairs under this program would subject SDG&E to regulatory sanctions, fines, and legal liability."

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00229.0
Category:	D. MANDATED
Category-Sub:	2. CORRECTIVE MAINT PROGRAM
Workpaper Group:	002290 - RAMP Base - CORRECTIVE MAINTENANCE PROGRAM (CMP)

Forecast Methodology:

Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

Non-Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00229.0
Category: D. MANDATED
Category-Sub: 2. CORRECTIVE MAINT PROGRAM
Workpaper Group: 002290 - RAMP Base - CORRECTIVE MAINTENANCE PROGRAM (CMP)

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	5,320	5,320	5,320	1	1	1	5,321	5,321	5,321
Non-Labor	5-YR Average	5,481	5,481	5,481	1	1	1	5,482	5,482	5,482
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**10,801**	**10,801**	**10,801**	**2**	**2**	**2**	**10,803**	**10,803**	**10,803**
FTE	5-YR Average	44.7	44.7	44.7	0.0	0.0	0.0	44.7	44.7	44.7

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00229.0
Category: D. MANDATED
Category-Sub: 2. CORRECTIVE MAINT PROGRAM
Workpaper Group: 002290 - RAMP Base - CORRECTIVE MAINTENANCE PROGRAM (CMP)

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	3,890	3,505	3,953	5,012	5,738
Non-Labor	5,105	4,425	4,902	5,891	5,949
NSE	0	0	0	0	0
Total	**8,995**	**7,930**	**8,855**	**10,903**	**11,687**
FTE	35.7	31.8	34.6	42.6	45.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	3,890	3,505	3,953	5,012	5,738
Non-Labor	5,105	4,425	4,902	5,891	5,949
NSE	0	0	0	0	0
Total	**8,995**	**7,930**	**8,855**	**10,903**	**11,687**
FTE	35.7	31.8	34.6	42.6	45.3
Vacation & Sick (Nominal $)					
Labor	564	556	631	774	952
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**564**	**556**	**631**	**774**	**952**
FTE	5.8	5.6	6.2	7.5	8.2
Escalation to 2016$					
Labor	486	286	176	80	0
Non-Labor	556	312	188	82	0
NSE	0	0	0	0	0
Total	**1,042**	**598**	**364**	**162**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	4,939	4,347	4,760	5,867	6,690
Non-Labor	5,661	4,736	5,090	5,973	5,949
NSE	0	0	0	0	0
Total	**10,600**	**9,083**	**9,850**	**11,839**	**12,639**
FTE	41.5	37.4	40.8	50.1	53.5

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00229.0
Category: D. MANDATED
Category-Sub: 2. CORRECTIVE MAINT PROGRAM
Workpaper Group: 002290 - RAMP Base - CORRECTIVE MAINTENANCE PROGRAM (CMP)

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 002290

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00229.0
Category:	D. MANDATED
Category-Sub:	2. CORRECTIVE MAINT PROGRAM
Workpaper Group:	002290 - RAMP Base - CORRECTIVE MAINTENANCE PROGRAM (CMP)
Workpaper Detail:	002290.001 - RAMP - Base - CORRECTIVE MAINT PROGRAM
In-Service Date:	Not Applicable

Description:

In lieu of the existing progarm in place short and long term deterioration of underground equipment could increase likelihood of asset failure (e.g. broken cable rack) and cause potential risks, including injury or death, to the public and workers. Degraded equipment would also increase volume and frequency of forced distribution outages, creating risks for public safety. As this program is mandated per GO 165, non-compliance poses risk of regulatory action, including fines. Underground connectors are inspected by infrared technology per ESP 120 (upon entry of facility) and replaced accordingly.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	5,321	5,321	5,321
Non-Labor	5,482	5,482	5,482
NSE	0	0	0
Total	**10,803**	**10,803**	**10,803**
FTE	44.7	44.7	44.7

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00229.0
Category:	D. MANDATED
Category-Sub:	2. CORRECTIVE MAINT PROGRAM
Workpaper Group:	002290 - RAMP Base - CORRECTIVE MAINTENANCE PROGRAM (CMP)
Workpaper Detail:	002290.001 - RAMP - Base - CORRECTIVE MAINT PROGRAM

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: EDUG Corrective Maintenance Program Improvement of Underground Service

Program Description: In lieu of the existing progarm in place, short and long term deterioration of underground equipment could increase likelihood of asset failure (e.g. broken cable rack) and cause potential risks, including injury or death, to the public and workers. Degraded equipment would also increase volume and frequency of forced distribution outages, creating risks for public safety. As this program is mandated per GO 165, non-compliance poses risk of regulatory action, including fines. Underground connectors are inspected by infrared technology per ESP 120 (upon entry of facility) and replaced accordingly.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Inspection, Repair, Maintenance & Replacement Programs

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	10,224	10,224	10,224
High	13,291	13,291	13,291

Funding Source: CPUC-GRC

Forecast Method: Average

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 12640

Explanation: This is item is all related to RAMP

Beginning of Workpaper Group
002890 - CMP UG Switch Replacement & Manhole Repair

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00289.0
Category: D. MANDATED
Category-Sub: 3. DOE Switch/Manhole Replacement
Workpaper Group: 002890 - CMP UG Switch Replacement & Manhole Repair

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	744	567	1,073	445	1,008	767	767	767
Non-Labor	5-YR Average	4,578	3,490	4,551	5,268	5,470	4,671	4,671	4,671
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**5,322**	**4,057**	**5,624**	**5,713**	**6,477**	**5,438**	**5,438**	**5,438**
FTE	5-YR Average	4.6	4.0	7.3	2.9	5.9	4.9	4.9	4.9

Business Purpose:

The purpose of this project is to replace or remove underground and overhead switches, and to repair underground structures, all of which impact system integrity, and may pose a risk to employee and public safety. Switches are a vital part of SDG&E's distribution infrastructure; they allow for the isolation of problems on the electric system, and they reduce outage impact. Substructures, such as manholes, are equally as important as they contain critical pieces of distribution equipment. Their structural integrity is important to prevent cave-ins and falling debris, which could injure crews, damage equipment, and threaten surface traffic. The result of this project will be improved operational safety, reliability, and a reduction in maintenance and operational costs, and decreased public reliability risk.

Physical Description:

Replace or remove underground and overhead switches, and to repair underground structures.

Project Justification:

The primary objectives of this program are to maintain distribution equipment and facilities for the safety and well-being of both employees and the general public and to comply with General Order's 95, 128 and 165. Failure to implement this program will significantly reduce reliability, limit operational flexibility, and may subject SDG&E to possible fines from the CPUC. Without implementing such a program SDG&E may increase the risk of equipment failure and prolonged outages.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00289.0
Category:	D. MANDATED
Category-Sub:	3. DOE Switch/Manhole Replacement
Workpaper Group:	002890 - CMP UG Switch Replacement & Manhole Repair

Forecast Methodology:

Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

Non-Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00289.0
Category: D. MANDATED
Category-Sub: 3. DOE Switch/Manhole Replacement
Workpaper Group: 002890 - CMP UG Switch Replacement & Manhole Repair

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	767	767	767	0	0	0	767	767	767
Non-Labor	5-YR Average	4,671	4,671	4,671	0	0	0	4,671	4,671	4,671
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**5,438**	**5,438**	**5,438**	**0**	**0**	**0**	**5,438**	**5,438**	**5,438**
FTE	5-YR Average	4.9	4.9	4.9	0.0	0.0	0.0	4.9	4.9	4.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00289.0
Category: D. MANDATED
Category-Sub: 3. DOE Switch/Manhole Replacement
Workpaper Group: 002890 - CMP UG Switch Replacement & Manhole Repair

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	586	458	891	380	864
Non-Labor	4,128	3,260	4,382	5,196	5,470
NSE	0	0	0	0	0
Total	**4,714**	**3,718**	**5,273**	**5,576**	**6,334**
FTE	4.0	3.4	6.2	2.5	5.0
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	586	458	891	380	864
Non-Labor	4,128	3,260	4,382	5,196	5,470
NSE	0	0	0	0	0
Total	**4,714**	**3,718**	**5,273**	**5,576**	**6,334**
FTE	4.0	3.4	6.2	2.5	5.0
Vacation & Sick (Nominal $)					
Labor	85	73	142	59	143
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**85**	**73**	**142**	**59**	**143**
FTE	0.6	0.6	1.1	0.4	0.9
Escalation to 2016$					
Labor	73	37	40	6	0
Non-Labor	450	230	168	72	0
NSE	0	0	0	0	0
Total	**523**	**267**	**208**	**78**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	744	567	1,073	445	1,008
Non-Labor	4,578	3,490	4,551	5,268	5,470
NSE	0	0	0	0	0
Total	**5,322**	**4,057**	**5,624**	**5,713**	**6,477**
FTE	4.6	4.0	7.3	2.9	5.9

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00289.0
Category: D. MANDATED
Category-Sub: 3. DOE Switch/Manhole Replacement
Workpaper Group: 002890 - CMP UG Switch Replacement & Manhole Repair

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 002890

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00289.0
Category:	D. MANDATED
Category-Sub:	3. DOE Switch/Manhole Replacement
Workpaper Group:	002890 - CMP UG Switch Replacement & Manhole Repair
Workpaper Detail:	002890.001 - RAMP - Base - DOE Switch/Manhole Replacemen
In-Service Date:	Not Applicable

Description:

The purpose of this project is to replace or remove underground and overhead switches, and to repair underground structures, all of which impact system integrity, and may pose a risk to employee and public safety. Switches are a vital part of SDG&E's distribution infrastructure; they allow for the isolation of problems on the electric system, and they reduce outage impact. Substructures, such as manholes, are equally as important as they contain critical pieces of distribution equipment. Their structural integrity is important to prevent cave-ins and falling debris, which could injure crews, damage equipment, and threaten surface traffic. The result of this project will be improved operational safety, reliability, and a reduction in maintenance and operational costs, and decreased public reliability risk.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	767	767	767
Non-Labor	4,671	4,671	4,671
NSE	0	0	0
Total	**5,438**	**5,438**	**5,438**
FTE	4.9	4.9	4.9

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00289.0
Category:	D. MANDATED
Category-Sub:	3. DOE Switch/Manhole Replacement
Workpaper Group:	002890 - CMP UG Switch Replacement & Manhole Repair
Workpaper Detail:	002890.001 - RAMP - Base - DOE Switch/Manhole Replacemen

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: CMP Switch Replacement & Manhole Repair

Program Description: In lieu of the existing progarm in place, short and long term structural deterioration of manholes and degradation of distribution switches cause potential risks, including injury or death, to the public and workers. Degraded equipment would also increase volume and frequency of forced distribution outages, creating risks for public safety. As this program is mandated per GO 165, non-compliance poses risk of regulatory action, including fines.

Risk/Mitigation:

Risk: na

Mitigation: Distribution Switch Maintenance Program

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	5,180	5,180	5,180
High	6,734	6,734	6,734

Funding Source: CPUC-GRC

Forecast Method: Average

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 6476

Explanation: This item is all related to RAMP

Beginning of Workpaper Group
062470 - Replacement Of Live Front Equipment

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06247.0
Category: D. MANDATED
Category-Sub: 4. REPLACEMENT OF LIVE FRONT EQUIPMENT
Workpaper Group: 062470 - Replacement Of Live Front 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	155	151	65	50	55	73	73	73
Non-Labor	Zero-Based	809	120	339	370	460	612	612	612
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**964**	**271**	**404**	**420**	**515**	**685**	**685**	**685**
FTE	Zero-Based	0.9	1.0	0.4	0.3	0.4	0.7	0.7	0.7

Business Purpose:

The purpose of this project is to replace live front padmounted distribution equipment with dead front padmounted distribution equipment when it is encountered during normal SDG&E work. Live-front equipment is electric components enclosed in a protective (usually steel) cabinet which does not have additional protective barriers; live electric connections are exposed when the cabinet is open, and action which is supposed to only be performed by qualified electric personnel. Live front equipment was primarily installed on SDG&E's electric distribution system during the 1960's and 1970's, and has since become obsolete, being replaced by 'dead-front' equipment which has additional safety barriers such as removable fiberglass or composite plates, protective covers or additional compartmentalization. This project will improve operational flexibility, reliability, and safety for SDG&E field personnel, as well as the public. While monitoring equipment does exist for substation switchgear, the cost to add monitoring equipment to distribution switches is close to what it would cost to replace SF6 switches with vacuum switches. In addition, the communications equipment necessary to send real-time information to a centralized location does not currently exist out on the distribution system, unless SCADA infrastructure is located nearby. SDG&E has approximately 1,000 SF6 distribution switches (padmounted and underground), and is currently proposing a program to replace the switches with non-SF6 switches over the next 5 years. One alternative is to not do anything, but the risk is a potential leak to the environment, thus causing harm to the environment and significant fines ($50k per day, per violation, and the total fine could be in the million dollar range, depending on the extent of the damage). Another alternative is to install monitoring equipment, but as described above, the cost and feasibility make it unviable.

Physical Description:

"Live front equipment is defined by having the primary connections exposed with no insulative covering. Thus, when the equipment is opened, there are energized (or live) conductors present. This equipment was the primary choice for padmounted equipment in the 1960's and 1970's by many utilities. Since that time, this type of equipment has been replaced by dead front equipment, where the energized primary conductors are not exposed. For this project, when a job is being worked on the SDG&E distribution system that involves working with live front equipment, the equipment that is involved will be replaced with dead front equipment and charged to this project. With new technologies, many of the units can be changed out directly with a dead front unit, but in some cases additional equipment has to be installed to convert to dead front design. In both cases, there will be an additional cost for the replacement. This incremental cost will be charged to this project."

Project Justification:

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06247.0
Category:	D. MANDATED
Category-Sub:	4. REPLACEMENT OF LIVE FRONT EQUIPMENT
Workpaper Group:	062470 - Replacement Of Live Front Equipment

"The primary objective of this project is to increase the employee safety, public safety, operational flexibility, and the reliability of the SDG&E electric distribution system. SDG&E has been working with live front equipment since the 1960's. SDG&E is one of the few utilities that will allow its linemen to perform operations on this type of equipment while energized on its distribution system. This has been done safely in the past due to proper training and the use of proper tools, but as SDG&E's workforce matures and linemen come in from other utilities, it is losing this experience. Replacement of live front equipment will increase operational safety for our work force. It will also increase the safety for the public by insulating primary conductors in distribution equipment. Even though the connections to distribution equipment are behind locked cabinet doors, live front equipment poses a significantly higher risk for wire entry conditions. Live front equipment is also more difficult to work with as compared to dead front equipment. Electric service isolation and restoration procedures are performed with greater ease and speed on dead front equipment, thus, improving SDG&E's operational flexibility and electric reliability to its customers. In addition to the justifications given, the manufacturing of this equipment has slowed in recent years and SDG&E has been paying a premium for manufacturers to build live front equipment for replacements. In addition, rodent/reptile contacts to exposed primary are eliminated. The reason 5 years was selected as the time period in which to complete these replacements is because it resolves the risk by 2020, while also not overextending resources to ge the work done."

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06247.0
Category:	D. MANDATED
Category-Sub:	4. REPLACEMENT OF LIVE FRONT EQUIPMENT
Workpaper Group:	062470 - Replacement Of Live Front Equipment

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06247.0
Category: D. MANDATED
Category-Sub: 4. REPLACEMENT OF LIVE FRONT EQUIPMENT
Workpaper Group: 062470 - Replacement Of Live Front 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	73	73	73	0	0	0	73	73	73
Non-Labor	Zero-Based	612	612	612	0	0	0	612	612	612
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**685**	**685**	**685**	**0**	**0**	**0**	**685**	**685**	**685**
FTE	Zero-Based	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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06247.0
Category: D. MANDATED
Category-Sub: 4. REPLACEMENT OF LIVE FRONT EQUIPMENT
Workpaper Group: 062470 - Replacement Of Live Front Equipment

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	122	122	54	43	47
Non-Labor	730	112	327	365	460
NSE	0	0	0	0	0
Total	**852**	**234**	**381**	**408**	**507**
FTE	0.8	0.9	0.3	0.3	0.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	122	122	54	43	47
Non-Labor	730	112	327	365	460
NSE	0	0	0	0	0
Total	**852**	**234**	**381**	**408**	**507**
FTE	0.8	0.9	0.3	0.3	0.3
Vacation & Sick (Nominal $)					
Labor	18	19	9	7	8
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**18**	**19**	**9**	**7**	**8**
FTE	0.1	0.1	0.1	0.0	0.1
Escalation to 2016$					
Labor	15	10	2	1	0
Non-Labor	80	8	13	5	0
NSE	0	0	0	0	0
Total	**95**	**18**	**15**	**6**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	155	151	65	50	55
Non-Labor	809	120	339	370	460
NSE	0	0	0	0	0
Total	**964**	**271**	**404**	**420**	**515**
FTE	0.9	1.0	0.4	0.3	0.4

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06247.0
Category: D. MANDATED
Category-Sub: 4. REPLACEMENT OF LIVE FRONT EQUIPMENT
Workpaper Group: 062470 - Replacement Of Live Front 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 062470

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06247.0
Category:	D. MANDATED
Category-Sub:	4. REPLACEMENT OF LIVE FRONT EQUIPMENT
Workpaper Group:	062470 - Replacement Of Live Front Equipment
Workpaper Detail:	062470.001 - RAMP- Base - REPLACEMENT OF LIVE FRONT EQUIPMENT
In-Service Date:	Not Applicable

Description:

When a job is being worked on the SDG&E distribution system that involves working with live-front equipment, the pieces of equipment that are involved will be replaced with dead-front equipment and the incremental cost will be charged to this budget.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	73	73	73
Non-Labor	612	612	612
NSE	0	0	0
Total	**685**	**685**	**685**
FTE	0.7	0.7	0.7

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06247.0
Category:	D. MANDATED
Category-Sub:	4. REPLACEMENT OF LIVE FRONT EQUIPMENT
Workpaper Group:	062470 - Replacement Of Live Front Equipment
Workpaper Detail:	062470.001 - RAMP- Base - REPLACEMENT OF LIVE FRONT EQUIPMENT

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Replace live front transformers and terminators

Program Description: Continued use of live front transformers and terminators causes risks to workers who rely on limited tools (e.g. "VCT") to operate the live equipment. As an alternative to using this equipment, switching plans can consider operating deadfront or remote operated equipment elsewhere on the system to create electric isolation for a job or for safe operation of the live front equipment, however this would likely cause unecessary outage exposure to additional customers. If the limited switching tools are insufficent, workers may be dangerously exposed to live primary voltage, causing serious risks for injury or death.

Risk/Mitigation:

Risk: na

Mitigation: Live Front Transformer and Terminator Replacement

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	685	685	685
High	891	891	891

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 515

Explanation: This item is all related to RAMP

Beginning of Workpaper Group
102650 - Avian Protection

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10265.0
Category: D. MANDATED
Category-Sub: 5. Avian Protection
Workpaper Group: 102650 - Avian Protection

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	662	574	970	344	92	454	454	454
Non-Labor	Zero-Based	1,154	1,006	580	212	8	1,181	1,181	1,181
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**1,816**	**1,580**	**1,550**	**556**	**100**	**1,635**	**1,635**	**1,635**
FTE	Zero-Based	3.6	3.2	5.1	2.2	1.1	4.5	4.5	4.5

Business Purpose:

"Identify and retro-fit, rearrange, or build-to-standard distribution poles in the SDG&E service territory to prevent electrocution
of birds in compliance with:
1. Migratory Bird Treaty Act
2. Bald and Golden Eagle Protection Act
3. Codes defined by California Department of Fish and Game
The project will also:
1. Harden the system and reduce fire risk associated with avian electrocutions
2. Improve SDG&E reliability and customer service
3. Will align with Avian Power Line Interaction Committee (APLIC) Guidelines"

Physical Description:

The plan will systematically inspect all distribution lines and poles in the overhead distribution system that either 1) lie within the Avian Protection Zone, or 2) have associated known bird contacts, in which case we will identify and resolve potential avian risks

Project Justification:

"To ensure SDG&E is in compliance with State and Federal laws:

1. Migratory Bird Treaty Act

2. Bald and Golden Eagle Protection Act

3. Codes defined by California Department of Fish and Game"

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10265.0
Category:	D. MANDATED
Category-Sub:	5. Avian Protection
Workpaper Group:	102650 - Avian Protection

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10265.0
Category: D. MANDATED
Category-Sub: 5. Avian Protection
Workpaper Group: 102650 - Avian Protection

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	454	454	454	0	0	0	454	454	454
Non-Labor	Zero-Based	1,181	1,181	1,181	0	0	0	1,181	1,181	1,181
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**1,635**	**1,635**	**1,635**	**0**	**0**	**0**	**1,635**	**1,635**	**1,635**
FTE	Zero-Based	4.5	4.5	4.5	0.0	0.0	0.0	4.5	4.5	4.5

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10265.0
Category: D. MANDATED
Category-Sub: 5. Avian Protection
Workpaper Group: 102650 - Avian Protection

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	521	463	806	294	79
Non-Labor	1,041	940	558	209	8
NSE	0	0	0	0	0
Total	**1,562**	**1,403**	**1,364**	**503**	**87**
FTE	3.1	2.7	4.3	1.9	0.9
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	521	463	806	294	79
Non-Labor	1,041	940	558	209	8
NSE	0	0	0	0	0
Total	**1,562**	**1,403**	**1,364**	**503**	**87**
FTE	3.1	2.7	4.3	1.9	0.9
Vacation & Sick (Nominal $)					
Labor	75	73	129	45	13
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**75**	**73**	**129**	**45**	**13**
FTE	0.5	0.5	0.8	0.3	0.2
Escalation to 2016$					
Labor	65	38	36	5	0
Non-Labor	113	66	21	3	0
NSE	0	0	0	0	0
Total	**179**	**104**	**57**	**8**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	662	574	970	344	92
Non-Labor	1,154	1,006	580	212	8
NSE	0	0	0	0	0
Total	**1,816**	**1,580**	**1,550**	**556**	**100**
FTE	3.6	3.2	5.1	2.2	1.1

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10265.0
Category: D. MANDATED
Category-Sub: 5. Avian Protection
Workpaper Group: 102650 - Avian Protection

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 102650

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10265.0
Category:	D. MANDATED
Category-Sub:	5. Avian Protection
Workpaper Group:	102650 - Avian Protection
Workpaper Detail:	102650.001 - RAMP- Base - Avian Protection
In-Service Date:	Not Applicable

Description:

RAMP - TBD

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	454	454	454
Non-Labor	1,181	1,181	1,181
NSE	0	0	0
Total	**1,635**	**1,635**	**1,635**
FTE	4.5	4.5	4.5

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10265.0
Category: D. MANDATED
Category-Sub: 5. Avian Protection
Workpaper Group: 102650 - Avian Protection
Workpaper Detail: 102650.001 - RAMP- Base - Avian Protection

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Continued deployment of distribution avian protection systems in at-risk areas

Program Description: Bird and other wildlife contact on overhead transmission and distribution facilities must closely be managed in order to protect wildlife from accidental death, prevent electric outages and utility facility damage, and prevent regulatory intervention, i.e. fines. Continue avian protection equipment installation and related procedures per OH Construction Standards.

Risk/Mitigation:

Risk: na

Mitigation: GO165: Distribution Inspect and Repair program

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	1,575	1,575	1,575
High	2,048	2,048	2,048

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 100

Explanation: This item is all related to RAMP

Beginning of Workpaper Group
11144A - 13270 C1162 BD: New 12kV Circuit

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11144.0
Category: D. MANDATED
Category-Sub: 6. C1162 BD: New 12kV Circuit
Workpaper Group: 11144A - 13270 C1162 BD: New 12kV Circuit

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	654	0
Non-Labor	Zero-Based	0	0	0	0	0	0	602	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**1,256**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0

Business Purpose:

Comply with state and federal requirements and increase public and employee safety by installing wireless communication aerial marking and lighting.

Physical Description:

Comply with state and federal requirements and increase public and employee safety by installing wireless communication aerial marking and lighting.

Project Justification:

FAA establishes the standards and notification criteria for the construction or alteration of objects affecting navigable airspace. SDG&E must meet those requirements as well as California State Aeronautics Code Title 21 and local Airport Land Use Commissions.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11144.0
Category:	D. MANDATED
Category-Sub:	6. C1162 BD: New 12kV Circuit
Workpaper Group:	11144A - 13270 C1162 BD: New 12kV Circuit

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 11144A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11144.0
Category:	D. MANDATED
Category-Sub:	6. C1162 BD: New 12kV Circuit
Workpaper Group:	11144A - 13270 C1162 BD: New 12kV Circuit
Workpaper Detail:	11144A.001 - RAMP - Incremental On Ramp Aerial Light - Post Filing Incremental
In-Service Date:	08/31/2018

Description:

Project will require trenching and installing 1000 kcmil cable along with a manual 4 Way Trayer and a overhead SCADA capacitor. An overhead section will be reconductored as part of this job as well as retagging appropriate electric distribution equipment.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	654	0
Non-Labor	0	602	0
NSE	0	0	0
Total	**0**	**1,256**	**0**
FTE	0.0	6.5	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11144.0
Category:	D. MANDATED
Category-Sub:	6. C1162 BD: New 12kV Circuit
Workpaper Group:	11144A - 13270 C1162 BD: New 12kV Circuit
Workpaper Detail:	11144A.001 - RAMP - Incremental On Ramp Aerial Light - Post Filing Incremental

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: On Ramp Aerial Lighting

Program Description: Installing Aerial Marking and Lighting

Risk/Mitigation:

Risk: Compliance

Mitigation: Install aerial Marking and Lighting

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Mandated

Work Type Citation: ..

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13264.0
Category: D. MANDATED
Category-Sub: 7. DISTRIBUTED GEN INTERCONNECT PRO - COLLECTIBLE
Workpaper Group: 132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO

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	45	30	96	0
Non-Labor	Zero-Based	0	0	12	10	208	477	363	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**12**	**10**	**253**	**507**	**459**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.4	0.3	1.0	0.0

Business Purpose:

To fascilitate the interconnection of customer or developer owned generation to SDG&E's electric distribution system.

Physical Description:

Perform engineering, design, and construction of interconnection facilities from generator switchgear to the point of interconnection on SDG&E's distribution system. Most generators interconnected under this budget are .5 to 10 MW in size.

Project Justification:

SDG&E's is mandated by Electric Rule 21 and the Wholesale Distribution Open Access Tariff (WDAT) to interconnection customer or developer owned generators.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13264.0
Category:	D. MANDATED
Category-Sub:	7. DISTRIBUTED GEN INTERCONNECT PRO - COLLECTIBLE
Workpaper Group:	132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13264.0
Category: D. MANDATED
Category-Sub: 7. DISTRIBUTED GEN INTERCONNECT PRO - COLLECTIBLE
Workpaper Group: 132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO

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	30	96	0	0	0	0	30	96	0
Non-Labor	Zero-Based	477	363	0	0	0	0	477	363	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**507**	**459**	**0**	**0**	**0**	**0**	**507**	**459**	**0**
FTE	Zero-Based	0.3	1.0	0.0	0.0	0.0	0.0	0.3	1.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13264.0
Category: D. MANDATED
Category-Sub: 7. DISTRIBUTED GEN INTERCONNECT PRO - COLLECTIBLE
Workpaper Group: 132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	39
Non-Labor	0	0	12	9	208
NSE	0	0	0	0	0
Total	**0**	**0**	**12**	**10**	**247**
FTE	0.0	0.0	0.0	0.0	0.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	0	0	39
Non-Labor	0	0	12	9	208
NSE	0	0	0	0	0
Total	**0**	**0**	**12**	**10**	**247**
FTE	0.0	0.0	0.0	0.0	0.3
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	6
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**6**
FTE	0.0	0.0	0.0	0.0	0.1
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	45
Non-Labor	0	0	12	10	208
NSE	0	0	0	0	0
Total	**0**	**0**	**12**	**10**	**253**
FTE	0.0	0.0	0.0	0.0	0.4

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13264.0
Category: D. MANDATED
Category-Sub: 7. DISTRIBUTED GEN INTERCONNECT PRO - COLLECTIBLE
Workpaper Group: 132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO

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 132640

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13264.0
Category:	D. MANDATED
Category-Sub:	7. DISTRIBUTED GEN INTERCONNECT PRO - COLLECTIBLE
Workpaper Group:	132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO
Workpaper Detail:	132640.001 - RAMP - Incremental - DISTRIBUTED GENERATION INTERCONNECT PRO
In-Service Date:	Not Applicable

Description:

Perform engineering design and construction of interconnection facilities from generator switchgear to the point of interconnection on SDG&E's distribution system. Most generators interconnected under this budget are .5 to 10 MW in size.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	30	96	0
Non-Labor	477	225	0
NSE	0	0	0
Total	**507**	**321**	**0**
FTE	0.3	1.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13264.0
Category:	D. MANDATED
Category-Sub:	7. DISTRIBUTED GEN INTERCONNECT PRO - COLLECTIBLE
Workpaper Group:	132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO
Workpaper Detail:	132640.001 - RAMP - Incremental - DISTRIBUTED GENERATION INTERCONNECT PRO

RAMP Item # 1

RAMP Chapter: SDG&E-4

Program Name: Power Quality Studies of DER Interconnections

Program Description: Addresses the operational issues concerning the interconnection of DERs to the distribution system

Risk/Mitigation:

Risk: SDG&E-04

Mitigation: Power Quality Studies of DER Interconnections

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	200	200	0
High	400	400	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: -

Historical Embedded Cost Estimates ($000)

Embedded Costs: 253

Explanation:

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13264.0
Category:	D. MANDATED
Category-Sub:	7. DISTRIBUTED GEN INTERCONNECT PRO - COLLECTIBLE
Workpaper Group:	132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO
Workpaper Detail:	132640.002 - RAMP - Incremental DISTRIBUTED GENERATION INTERCONNECT PRO - COLLECTIBLE
In-Service Date:	Not Applicable

Description:

Perform engineering design and construction of interconnection facilities from generator switchgear to the point of interconnection on SDG&E's distribution system. Most generators interconnected under this budget are .5 to 10 MW in size.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	0
Non-Labor	0	138	0
NSE	0	0	0
Total	**0**	**138**	**0**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13264.0
Category:	D. MANDATED
Category-Sub:	7. DISTRIBUTED GEN INTERCONNECT PRO - COLLECTIBLE
Workpaper Group:	132640 - DISTRIBUTED GENERATION INTERCONNECT. PRO
Workpaper Detail:	132640.002 - RAMP - Incremental DISTRIBUTED GENERATION INTERCONNECT PRO - COLLECTIBLE

RAMP Item # 1

RAMP Chapter: SDG&E-4

Program Name: See Input Detail 01

Program Description: See Input Detail 01

Risk/Mitigation:

Risk: SDG&E - 4

Mitigation: Power Quality Studies DER Interconnetions

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Mandated

Work Type Citation: See Input Detail 01

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: See Input Detail 01

Beginning of Workpaper Group
872320 - Pole Replacement And Reinforcement - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 87232.0
Category: D. MANDATED
Category-Sub: 8. Annual Pole Reinforcement
Workpaper Group: 872320 - Pole Replacement And Reinforcement - RAMP

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	2,561	2,912	4,479	4,674	5,468	4,019	4,019	4,019
Non-Labor	5-YR Average	8,114	12,786	9,184	9,540	9,996	9,924	9,924	9,924
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**10,675**	**15,698**	**13,663**	**14,214**	**15,463**	**13,943**	**13,943**	**13,943**
FTE	5-YR Average	22.0	25.0	37.0	39.7	45.6	33.9	33.9	33.9

Business Purpose:

This budget provides funding for the pole restoration and replacement program for in-service distribution poles utilizing steel and fiberglass poles. These replacements are incorporated into routine Corrective Maintenance Program (CMP) pole replacements. Wood pole damage is attributed to numerous factors including, but not limited to, the loss of original preservative treatment experienced with Penta-Cellon poles (Pentachlorophenol, a pesticide, and Cellon, a preservative treatment for wood poles used by the DOW Chemical Company to inject pentachlorophenol using a liquid petroleum gas such as propane), the presence of fungi decay, and bird and/or termite damage. All electric distribution poles and associated equipment are visually patrolled on an annual basis in urban and rural areas, inspected in detail every five years, and receive a wood pole intrusive inspection on average every ten years.

Physical Description:

This budget provides funding to continue the pole restoration, replacement and removal program for electric distribution poles identified through the CMP program

Project Justification:

In lieu of the existing progarm in place, which installs C-truss structures to reinforce poles, short and long term deterioration of equipment could increase likelihood of asset failure (e.g. broken poles) and cause potential risks, including injury or death, to the public and workers. Degraded equipment would also increase volume and frequency of forced distribution outages, creating risks for public safety. As this program is mandated per GO 165, non-compliance poses risk of regulatory action, including fines.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	87232.0
Category:	D. MANDATED
Category-Sub:	8. Annual Pole Reinforcement
Workpaper Group:	872320 - Pole Replacement And Reinforcement - RAMP

Forecast Methodology:

Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

Non-Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 87232.0
Category: D. MANDATED
Category-Sub: 8. Annual Pole Reinforcement
Workpaper Group: 872320 - Pole Replacement And Reinforcement - RAMP

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	4,018	4,018	4,018	1	1	1	4,019	4,019	4,019
Non-Labor	5-YR Average	9,923	9,923	9,923	1	1	1	9,924	9,924	9,924
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**13,941**	**13,941**	**13,941**	**2**	**2**	**2**	**13,943**	**13,943**	**13,943**
FTE	5-YR Average	33.9	33.9	33.9	0.0	0.0	0.0	33.9	33.9	33.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 87232.0
Category: D. MANDATED
Category-Sub: 8. Annual Pole Reinforcement
Workpaper Group: 872320 - Pole Replacement And Reinforcement - RAMP

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	2,017	2,348	3,719	3,994	4,690
Non-Labor	7,316	11,945	8,844	9,409	9,996
NSE	0	0	0	0	0
Total	**9,333**	**14,293**	**12,564**	**13,403**	**14,685**
FTE	18.9	21.3	31.4	33.8	38.6
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	2,017	2,348	3,719	3,994	4,690
Non-Labor	7,316	11,945	8,844	9,409	9,996
NSE	0	0	0	0	0
Total	**9,333**	**14,293**	**12,564**	**13,403**	**14,685**
FTE	18.9	21.3	31.4	33.8	38.6
Vacation & Sick (Nominal $)					
Labor	292	372	594	617	778
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**292**	**372**	**594**	**617**	**778**
FTE	3.1	3.7	5.6	5.9	7.0
Escalation to 2016$					
Labor	252	192	166	64	0
Non-Labor	798	841	340	131	0
NSE	0	0	0	0	0
Total	**1,049**	**1,033**	**506**	**195**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	2,561	2,912	4,479	4,674	5,468
Non-Labor	8,114	12,786	9,184	9,540	9,996
NSE	0	0	0	0	0
Total	**10,675**	**15,698**	**13,663**	**14,214**	**15,463**
FTE	22.0	25.0	37.0	39.7	45.6

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 87232.0
Category: D. MANDATED
Category-Sub: 8. Annual Pole Reinforcement
Workpaper Group: 872320 - Pole Replacement And Reinforcement - RAMP

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 872320

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	87232.0
Category:	D. MANDATED
Category-Sub:	8. Annual Pole Reinforcement
Workpaper Group:	872320 - Pole Replacement And Reinforcement - RAMP
Workpaper Detail:	872320.001 - RAMP - Base - Annual Pole Reinforcement
In-Service Date:	Not Applicable

Description:

Annual Pole Reinforcement

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	177	177	177
Non-Labor	455	455	455
NSE	0	0	0
Total	**632**	**632**	**632**
FTE	1.7	1.7	1.7

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	87232.0
Category:	D. MANDATED
Category-Sub:	8. Annual Pole Reinforcement
Workpaper Group:	872320 - Pole Replacement And Reinforcement - RAMP
Workpaper Detail:	872320.001 - RAMP - Base - Annual Pole Reinforcement

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Annual Pole Reinforcement

Program Description: In lieu of the existing progarm in place, which installs C-truss structures to reinforce poles, short and long term deterioration of equipment could increase likelihood of asset failure (e.g. broken poles) and cause potential risks, including injury or death, to the public and workers. Degraded equipment would also increase volume and frequency of forced distribution outages, creating risks for public safety. As this program is mandated per GO 165, non-compliance poses risk of regulatory action, including fines.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: GO165: Distribution Inspect and Repair program

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	632	632	632
High	822	822	822

Funding Source: CPUC-GRC

Forecast Method: Average

Work Type: Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 15463

Explanation: This item is all related to RAMP

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	87232.0
Category:	D. MANDATED
Category-Sub:	8. Annual Pole Reinforcement
Workpaper Group:	872320 - Pole Replacement And Reinforcement - RAMP
Workpaper Detail:	872320.002 - RAMP - Base - ED/OH Pole Replacement (CMP Only)
In-Service Date:	Not Applicable

Description:

ED/OH Pole Replacement (CMP Only)

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	3,842	3,842	3,842
Non-Labor	9,469	9,469	9,469
NSE	0	0	0
Total	**13,311**	**13,311**	**13,311**
FTE	32.2	32.2	32.2

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	87232.0
Category:	D. MANDATED
Category-Sub:	8. Annual Pole Reinforcement
Workpaper Group:	872320 - Pole Replacement And Reinforcement - RAMP
Workpaper Detail:	872320.002 - RAMP - Base - ED/OH Pole Replacement (CMP Only)

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: EDOH Pole Replacement (CMP Only)

Program Description: Upon inspection, replace at-risk poles.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: GO165: Distribution Inspect and Repair program

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	13,110	13,110	13,110
High	17,043	17,043	17,043

Funding Source: CPUC-GRC

Forecast Method: Average

Work Type: Mandated

Work Type Citation: N

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: The estimated 22016 embedded cost for this item is already entered in BC872320.001

Beginning of Workpaper Group
13266A - AERIAL MARKING FOR SAFETY

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13266.0
Category: D. MANDATED
Category-Sub: 9. AERIAL MARKING FOR SAFETY
Workpaper Group: 13266A - AERIAL MARKING FOR SAFETY

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	97	97	97
Non-Labor	Zero-Based	0	0	0	0	0	22	22	22
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**119**	**119**	**119**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8

Business Purpose:

Comply with state and federal requirements and increase public and employee safety by installing aerial marking and lighting.

Physical Description:

Comply with state and federal requirements and increase public and employee safety by installing aerial marking and lighting.

Project Justification:

FAA establishes the standards and notification criteria for the construction or alteration of objects affecting navigable airspace. SDG&E must meet those requirements as well as California State Aeronautics Code Title 21 and local Airport Land Use Commissions.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13266.0
Category:	D. MANDATED
Category-Sub:	9. AERIAL MARKING FOR SAFETY
Workpaper Group:	13266A - AERIAL MARKING FOR SAFETY

Forecast Methodology:

Labor - Zero-Based

ZERO Based Estimated based on possible results of pole and line assessments to locate required lighting and marking.

Non-Labor - Zero-Based

ZERO Based Estimated based on possible results of pole and line assessments to locate required lighting and marking.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 13266A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13266.0
Category: D. MANDATED
Category-Sub: 9. AERIAL MARKING FOR SAFETY
Workpaper Group: 13266A - AERIAL MARKING FOR SAFETY
Workpaper Detail: 13266A.001 - AERIAL MARKING FOR SAFETY

In-Service Date: Not Applicable

Description:

Comply with state and federal requirements and increase public and employee safety by installing aerial marking and lighting

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	97	97	97
Non-Labor	22	22	22
NSE	0	0	0
Total	**119**	**119**	**119**
FTE	0.8	0.8	0.8

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: E. MATERIALS
Workpaper: VARIOUS

Summary for Category: E. MATERIALS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	59	120	150	188
Non-Labor	12,707	24,751	26,165	27,506
NSE	0	0	0	0
Total	**12,766**	**24,871**	**26,315**	**27,694**
FTE	0.6	1.2	1.5	1.8
002020 ELECTRIC METERS & REGULATORS				
Labor	0	0	0	0
Non-Labor	-2,973	4,156	5,106	5,974
NSE	0	0	0	0
Total	**-2,973**	**4,156**	**5,106**	**5,974**
FTE	0.0	0.0	0.0	0.0
002140 TRANSFORMERS				
Labor	59	120	150	188
Non-Labor	15,680	20,595	21,059	21,532
NSE	0	0	0	0
Total	**15,739**	**20,715**	**21,209**	**21,720**
FTE	0.6	1.2	1.5	1.8

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002020 - ELECTRIC METERS & REGULATORS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00202.0
Category: E. MATERIALS
Category-Sub: 1. ELECTRIC METERS & REGULATORS
Workpaper Group: 002020 - ELECTRIC METERS & REGULATORS

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	2,831	1,289	1,573	7,976	-2,973	4,156	5,106	5,974
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**2,831**	**1,289**	**1,573**	**7,976**	**-2,973**	**4,156**	**5,106**	**5,974**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

An ongoing blanket project to purchase new watt-hour meters and regulators used to service the electric distribution customers. Requried to maintain inventory levels at each of the electirc distribution service centers.

Physical Description:

This budget provides funding to install distribution meters and regulators necessary to operate and maintain SDG&E's electric distribution system.

Project Justification:

An ongoing blanket project to purchase new watt-hour meters and regulators used to service the electric distribution customers. Requried to maintain inventory levels at each of the electirc distribution service centers.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00202.0
Category:	E. MATERIALS
Category-Sub:	1. ELECTRIC METERS & REGULATORS
Workpaper Group:	002020 - ELECTRIC METERS & REGULATORS

Forecast Methodology:

Labor - Zero-Based

N/A

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00202.0
Category: E. MATERIALS
Category-Sub: 1. ELECTRIC METERS & REGULATORS
Workpaper Group: 002020 - ELECTRIC METERS & REGULATORS

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	4,156	5,106	5,974	0	0	0	4,156	5,106	5,974
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**4,156**	**5,106**	**5,974**	**0**	**0**	**0**	**4,156**	**5,106**	**5,974**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00202.0
Category: E. MATERIALS
Category-Sub: 1. ELECTRIC METERS & REGULATORS
Workpaper Group: 002020 - ELECTRIC METERS & REGULATORS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	0
Non-Labor	2,552	1,204	1,515	7,866	2,371
NSE	0	0	0	0	0
Total	**2,552**	**1,204**	**1,515**	**7,866**	**2,371**
FTE	0.0	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	-5,344
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**-5,344**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	2,552	1,204	1,515	7,866	-2,973
NSE	0	0	0	0	0
Total	**2,552**	**1,204**	**1,515**	**7,866**	**-2,973**
FTE	0.0	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	278	85	58	109	0
NSE	0	0	0	0	0
Total	**278**	**85**	**58**	**109**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	0
Non-Labor	2,831	1,289	1,573	7,976	-2,973
NSE	0	0	0	0	0
Total	**2,831**	**1,289**	**1,573**	**7,976**	**-2,973**
FTE	0.0	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00202.0
Category: E. MATERIALS
Category-Sub: 1. ELECTRIC METERS & REGULATORS
Workpaper Group: 002020 - ELECTRIC METERS & REGULATORS

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	-5,344
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**-5,344**
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	-5,344	0	-5,344	0.0	EAMARE20161107083601963
Explanation:	Adjustment made to reflect actual 2016 spend through the month of Oct-16 and Nov-Dec Q3 Outlook						
2016 Total		0	-5,344	0	-5,344	0.0	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 002020

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00202.0
Category:	E. MATERIALS
Category-Sub:	1. ELECTRIC METERS & REGULATORS
Workpaper Group:	002020 - ELECTRIC METERS & REGULATORS
Workpaper Detail:	002020.001 - ELECTRIC METERS & REGULATORS
In-Service Date:	Not Applicable

Description:

Provide distribution meters and regulators necessary to operate and maintain SDG&E's electric distribution system for the year 2015.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	4,156	5,106	5,974
NSE	0	0	0
Total	**4,156**	**5,106**	**5,974**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002140 - TRANSFORMERS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00214.0
Category: E. MATERIALS
Category-Sub: 2. TRANSFORMERS
Workpaper Group: 002140 - TRANSFORMERS

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	39	54	62	104	59	120	150	188
Non-Labor	Zero-Based	19,709	16,650	13,413	20,817	15,680	20,595	21,059	21,532
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**19,749**	**16,704**	**13,475**	**20,920**	**15,739**	**20,715**	**21,209**	**21,720**
FTE	Zero-Based	0.5	0.6	0.6	1.1	0.6	1.2	1.5	1.8

Business Purpose:

Provide distribution transformers necessary to operate and maintain the electric distribution system.

Physical Description:

This blanket project provides the funds to purchase new line transformers. Materials are required to support the electric distribution system. This proposed budget considers capital projects and construction activities will be coordinated with this project.

Project Justification:

The funds for this blanket project are required to purchase new line transformers to be used to service the electric distribution system's customers. It is required to maintain inventory levels at each of the electric distribution service centers.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00214.0
Category:	E. MATERIALS
Category-Sub:	2. TRANSFORMERS
Workpaper Group:	002140 - TRANSFORMERS

Forecast Methodology:

Labor - Zero-Based

The forecast for this project is zero-based. The expenditures in this project are closely related to the work being done in New Business, Mandated, Capacity, Reliability, Safety and Risk Mitigation, as well as the other categories where transformers are installed. Historically, the primary drivers have been the mandated maintenance work and new business work, which together account for half of the expenditures. In addition to this increases in this project related to the other electric distribution increases, SDG&E is using FR3 fluid (Envirotemp FR3 fluid, a substitute for conventional transformer oils developed by Cargill) in transformers instead of the current mineral oil that is used. There is an incremental cost increase per unit, but the benefits of using FR3 are significant. FR3 improves fire safety, extends asset and insulation life, and has superior environmental benefits.

Non-Labor - Zero-Based

The forecast for this project is zero-based. The expenditures in this project are closely related to the work being done in New Business, Mandated, Capacity, Reliability, Safety and Risk Mitigation, as well as the other categories where transformers are installed. Historically, the primary drivers have been the mandated maintenance work and new business work, which together account for half of the expenditures. In addition to this increases in this project related to the other electric distribution increases, SDG&E is using FR3 fluid (Envirotemp FR3 fluid, a substitute for conventional transformer oils developed by Cargill) in transformers instead of the current mineral oil that is used. There is an incremental cost increase per unit, but the benefits of using FR3 are significant. FR3 improves fire safety, extends asset and insulation life, and has superior environmental benefits.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00214.0
Category: E. MATERIALS
Category-Sub: 2. TRANSFORMERS
Workpaper Group: 002140 - TRANSFORMERS

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	120	150	188	0	0	0	120	150	188
Non-Labor	Zero-Based	20,595	21,059	21,532	0	0	0	20,595	21,059	21,532
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**20,715**	**21,209**	**21,720**	**0**	**0**	**0**	**20,715**	**21,209**	**21,720**
FTE	Zero-Based	1.2	1.5	1.8	0.0	0.0	0.0	1.2	1.5	1.8

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00214.0
Category: E. MATERIALS
Category-Sub: 2. TRANSFORMERS
Workpaper Group: 002140 - TRANSFORMERS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	31	43	52	89	67
Non-Labor	17,772	15,555	12,917	20,531	19,369
NSE	0	0	0	0	0
Total	**17,803**	**15,598**	**12,969**	**20,620**	**19,436**
FTE	0.4	0.5	0.5	0.9	0.7
Adjustments (Nominal $) **					
Labor	0	0	0	0	-17
Non-Labor	0	0	0	0	-3,689
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**-3,706**
FTE	0.0	0.0	0.0	0.0	-0.2
Recorded-Adjusted (Nominal $)					
Labor	31	43	52	89	50
Non-Labor	17,772	15,555	12,917	20,531	15,680
NSE	0	0	0	0	0
Total	**17,803**	**15,598**	**12,969**	**20,620**	**15,730**
FTE	0.4	0.5	0.5	0.9	0.5
Vacation & Sick (Nominal $)					
Labor	5	7	8	14	8
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**5**	**7**	**8**	**14**	**8**
FTE	0.1	0.1	0.1	0.2	0.1
Escalation to 2016$					
Labor	4	4	2	1	0
Non-Labor	1,937	1,096	496	285	0
NSE	0	0	0	0	0
Total	**1,941**	**1,099**	**499**	**287**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	39	54	62	104	59
Non-Labor	19,709	16,650	13,413	20,817	15,680
NSE	0	0	0	0	0
Total	**19,749**	**16,704**	**13,475**	**20,920**	**15,739**
FTE	0.5	0.6	0.6	1.1	0.6

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00214.0
Category: E. MATERIALS
Category-Sub: 2. TRANSFORMERS
Workpaper Group: 002140 - TRANSFORMERS

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	0	0	0	0	-17
Non-Labor	0	0	0	0	-3,689
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**-3,706**
FTE	0.0	0.0	0.0	0.0	-0.2

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	-17	-3,689	0	-3,706	-0.2	EAMARE20161107094524870
Explanation:	Adjustment made to reflect actual 2016 spend through the month of Oct-16 and Nov-Dec Q3 Outlook						
2016 Total		-17	-3,689	0	-3,706	-0.2	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 002140

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00214.0
Category: E. MATERIALS
Category-Sub: 2. TRANSFORMERS
Workpaper Group: 002140 - TRANSFORMERS
Workpaper Detail: 002140.001 - TRANSFORMERS

In-Service Date: Not Applicable

Description:

An ongoing blanket project to purchase new line transformers used to service electric distribution customers. Required to maintain inventory levels at each of the electric distribution service centers.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	120	150	188
Non-Labor	20,595	21,059	21,532
NSE	0	0	0
Total	**20,715**	**21,209**	**21,720**
FTE	1.2	1.5	1.8

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: F. NEW BUSINESS
Workpaper: VARIOUS

Summary for Category: F. NEW BUSINESS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	5,597	5,593	5,210	5,508
Non-Labor	35,381	49,724	51,976	55,084
NSE	0	0	0	0
Total	**40,978**	**55,317**	**57,186**	**60,592**
FTE	48.7	53.9	49.9	52.1
002040 ELECTRIC DISTRIBUTION EASEMENTS				
Labor	1,039	577	577	577
Non-Labor	283	294	460	520
NSE	0	0	0	0
Total	**1,322**	**871**	**1,037**	**1,097**
FTE	12.5	5.8	5.8	5.8
002350 TRANSFORMER & METER INSTALLATIONS				
Labor	1,135	402	402	402
Non-Labor	2,392	3,102	3,102	3,102
NSE	0	0	0	0
Total	**3,527**	**3,504**	**3,504**	**3,504**
FTE	10.5	3.0	3.0	3.0
15258A Mid-Coast Trolley Extension				
Labor	0	998	9	0
Non-Labor	0	5,920	57	0
NSE	0	0	0	0
Total	**0**	**6,918**	**66**	**0**
FTE	0.0	10.5	0.2	0.0
002110 CONVERSION FROM OH-UG RULE 20B 20C				
Labor	81	131	145	160
Non-Labor	1,851	2,426	2,683	2,941
NSE	0	0	0	0
Total	**1,932**	**2,557**	**2,828**	**3,101**
FTE	0.6	1.3	1.5	1.6
002150 OH RESIDENTIAL NB				
Labor	13	42	51	54
Non-Labor	360	705	855	907
NSE	0	0	0	0
Total	**373**	**747**	**906**	**961**
FTE	0.1	0.2	0.5	0.5

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: F. NEW BUSINESS
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
002160 OH NON-RESIDENTIAL NB				
Labor	49	40	47	49
Non-Labor	464	769	903	949
NSE	0	0	0	0
Total	**513**	**809**	**950**	**998**
FTE	0.4	0.4	0.4	0.5
002170 UG RESIDENTIAL NB				
Labor	415	634	773	824
Non-Labor	6,383	12,024	15,282	16,169
NSE	0	0	0	0
Total	**6,798**	**12,658**	**16,055**	**16,993**
FTE	3.5	6.0	7.4	7.3
002180 UG NON-RESIDENTIAL NB				
Labor	286	469	568	598
Non-Labor	3,318	5,782	6,934	7,279
NSE	0	0	0	0
Total	**3,604**	**6,251**	**7,502**	**7,877**
FTE	2.0	4.5	5.5	5.8
002190 NEW BUSINESS INFRASTRUCTURE				
Labor	355	539	656	694
Non-Labor	5,940	6,875	8,288	8,743
NSE	0	0	0	0
Total	**6,295**	**7,414**	**8,944**	**9,437**
FTE	2.7	5.4	6.6	6.9
002240 NEW SERVICE INSTALLATIONS				
Labor	689	566	676	710
Non-Labor	4,057	4,385	5,331	5,626
NSE	0	0	0	0
Total	**4,746**	**4,951**	**6,007**	**6,336**
FTE	5.0	5.0	6.1	6.5
002250 CUSTOMER REQUESTED UPGRADES AND SERVICES				
Labor	1,535	1,195	1,306	1,440
Non-Labor	10,333	7,442	8,081	8,848
NSE	0	0	0	0
Total	**11,868**	**8,637**	**9,387**	**10,288**
FTE	11.4	11.8	12.9	14.2

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002040 - ELECTRIC DISTRIBUTION EASEMENTS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00204.0
Category: F. NEW BUSINESS
Category-Sub: 1. CONVERSION FROM OH-UG RULE 20B 20C-Non Collectible
Workpaper Group: 002040 - ELECTRIC DISTRIBUTION EASEMENTS

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	978	914	857	816	1,039	577	577	577
Non-Labor	Zero-Based	476	310	671	318	283	294	460	520
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**1,455**	**1,224**	**1,528**	**1,134**	**1,323**	**871**	**1,037**	**1,097**
FTE	Zero-Based	11.9	11.1	10.6	10.1	12.5	5.8	5.8	5.8

Business Purpose:

This capital budget is required to obtain new electric distribution easements necessary to provide service to new customers, accommodate street and highway relocations, underground conversions and other capital improvement projects to improve electrical service.

Physical Description:

Perform necessary surveys and mapping functions, document research, document preparation, and negotiations with private and governmental property owners for the acquisition of real property rights to allow the installation of new electrical distribution facilities on private property of public lands.

Project Justification:

Acquisition of real property easement rights to install new business electric facilities on private property to provide service for new customer loads. There is no reasonable alternative to this project as long as the company must install or maintain electric facilities on, under, or over private property or public lands.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00204.0
Category:	F. NEW BUSINESS
Category-Sub:	1. CONVERSION FROM OH-UG RULE 20B 20C-Non Collectible
Workpaper Group:	002040 - ELECTRIC DISTRIBUTION EASEMENTS

Forecast Methodology:

Labor - Zero-Based

This project forecast utilizes historical costs and anticipated growth levels in the Construction Unit Forecast. The forecast also takes into account existing easements that have expired or are expected to expire in this GRC forecast period. Appraisals are done to determine what the cost of new easements will actually be.

Non-Labor - Zero-Based

This project forecast utilizes historical costs and anticipated growth levels in the Construction Unit Forecast. The forecast also takes into account existing easements that have expired or are expected to expire in this GRC forecast period. Appraisals are done to determine what the cost of new easements will actually be.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00204.0
Category: F. NEW BUSINESS
Category-Sub: 1. CONVERSION FROM OH-UG RULE 20B 20C-Non Collectible
Workpaper Group: 002040 - ELECTRIC DISTRIBUTION EASEMENTS

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	577	577	577	0	0	0	577	577	577
Non-Labor	Zero-Based	294	460	520	0	0	0	294	460	520
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**871**	**1,037**	**1,097**	**0**	**0**	**0**	**871**	**1,037**	**1,097**
FTE	Zero-Based	5.8	5.8	5.8	0.0	0.0	0.0	5.8	5.8	5.8

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00204.0
Category: F. NEW BUSINESS
Category-Sub: 1. CONVERSION FROM OH-UG RULE 20B 20C-Non Collectible
Workpaper Group: 002040 - ELECTRIC DISTRIBUTION EASEMENTS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	771	737	712	697	719
Non-Labor	429	290	646	314	292
NSE	0	0	0	0	0
Total	**1,200**	**1,027**	**1,358**	**1,011**	**1,010**
FTE	10.2	9.4	9.0	8.6	8.5
Adjustments (Nominal $) **					
Labor	0	0	0	0	173
Non-Labor	0	0	0	0	-8
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**164**
FTE	0.0	0.0	0.0	0.0	2.1
Recorded-Adjusted (Nominal $)					
Labor	771	737	712	697	891
Non-Labor	429	290	646	314	283
NSE	0	0	0	0	0
Total	**1,200**	**1,027**	**1,358**	**1,011**	**1,175**
FTE	10.2	9.4	9.0	8.6	10.6
Vacation & Sick (Nominal $)					
Labor	112	117	114	108	148
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**112**	**117**	**114**	**108**	**148**
FTE	1.7	1.7	1.6	1.5	1.9
Escalation to 2016$					
Labor	96	60	32	11	0
Non-Labor	47	20	25	4	0
NSE	0	0	0	0	0
Total	**143**	**81**	**57**	**16**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	978	914	857	816	1,039
Non-Labor	476	310	671	318	283
NSE	0	0	0	0	0
Total	**1,455**	**1,224**	**1,528**	**1,134**	**1,323**
FTE	11.9	11.1	10.6	10.1	12.5

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00204.0
Category: F. NEW BUSINESS
Category-Sub: 1. CONVERSION FROM OH-UG RULE 20B 20C-Non Collectible
Workpaper Group: 002040 - ELECTRIC DISTRIBUTION EASEMENTS

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	0	0	0	0	173
Non-Labor	0	0	0	0	-8
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**164**
FTE	0.0	0.0	0.0	0.0	2.1

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	173	-8	0	164	2.1	EAMARE20161107084825387
Explanation:	Adjustment made to reflect actual 2016 spend through the month of Oct-16 and Nov-Dec Q3 Outlook						
2016 Total		173	-8	0	164	2.1	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 002040

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00204.0
Category:	F. NEW BUSINESS
Category-Sub:	1. CONVERSION FROM OH-UG RULE 20B 20C-Non Collectible
Workpaper Group:	002040 - ELECTRIC DISTRIBUTION EASEMENTS
Workpaper Detail:	002040.001 - ELECTRIC DISTRIBUTION EASEMENTS
In-Service Date:	Not Applicable

Description:

This capital budget is required to obtain new electric distribution easements necessary to provide service to new customers, accommodate street and highway relocations, underground conversions and other capital improvement projects to improve electrical service.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	577	577	577
Non-Labor	294	460	520
NSE	0	0	0
Total	**871**	**1,037**	**1,097**
FTE	5.8	5.8	5.8

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002110 - CONVERSION FROM OH-UG RULE 20B 20C

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00211.0
Category: F. NEW BUSINESS
Category-Sub: 2. OH RESIDENTIAL NB
Workpaper Group: 002110 - CONVERSION FROM OH-UG RULE 20B 20C

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	189	193	75	44	81	131	145	160
Non-Labor	5-YR Average	1,210	627	1,898	2,124	1,851	2,426	2,683	2,941
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**1,399**	**820**	**1,973**	**2,167**	**1,932**	**2,557**	**2,828**	**3,101**
FTE	5-YR Average	1.6	1.9	0.6	0.3	0.6	1.3	1.5	1.6

Business Purpose:

This project is required to convert existing electric overhead distribution lines to underground upon customer request.

Physical Description:

This project reflects SDG&E's portion of the costs for installing new underground facilities to replace existing overhead facilities for projects meeting the criteria for Rule 20B and 20C.

Project Justification:

SDG&E is responsible for a portion of the costs associated with converting overhead distribution lines to underground to comply with the "Rules for the Sale of Electric Energy"

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00211.0
Category:	F. NEW BUSINESS
Category-Sub:	2. OH RESIDENTIAL NB
Workpaper Group:	002110 - CONVERSION FROM OH-UG RULE 20B 20C

Forecast Methodology:

Labor - 5-YR Average

5YR Avg. Overhead to underground conversion activity levels cannot be tied directly to new customer growth forecasts since not all new developments require conversions. Some conversions are mandated of developers as a condition of receiving project permits. Others are simply the result of a customer or group of customers seeking to have overhead lines in their neighborhood removed. This makes predicting the volume of future conversion work difficult. However, increasing amounts of new development work suggest economic improvements that can spur increased interest in converting overhead lines to underground. To estimate future requirements for the conversion budget an average was taken of the last five years of actual net expenditures (normalized to 2016 dollar equivalents and inclusive of projected year-end figures for 2016). That average was increased by 10% for 2017 and increased again by 10% per year for each successive year through 2019.

Non-Labor - 5-YR Average

5YR Avg. Overhead to underground conversion activity levels cannot be tied directly to new customer growth forecasts since not all new developments require conversions. Some conversions are mandated of developers as a condition of receiving project permits. Others are simply the result of a customer or group of customers seeking to have overhead lines in their neighborhood removed. This makes predicting the volume of future conversion work difficult. However, increasing amounts of new development work suggest economic improvements that can spur increased interest in converting overhead lines to underground. To estimate future requirements for the conversion budget an average was taken of the last five years of actual net expenditures (normalized to 2016 dollar equivalents and inclusive of projected year-end figures for 2016). That average was increased by 10% for 2017 and increased again by 10% per year for each successive year through 2019.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00211.0
Category: F. NEW BUSINESS
Category-Sub: 2. OH RESIDENTIAL NB
Workpaper Group: 002110 - CONVERSION FROM OH-UG RULE 20B 20C

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	116	116	116	15	29	44	131	145	160
Non-Labor	5-YR Average	1,541	1,541	1,541	885	1,142	1,400	2,426	2,683	2,941
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**1,657**	**1,657**	**1,657**	**900**	**1,171**	**1,444**	**2,557**	**2,828**	**3,101**
FTE	5-YR Average	1.0	1.0	1.0	0.3	0.5	0.6	1.3	1.5	1.6

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	15	884	0	899	0.3	EAMARE20161201110957780
Explanation:	Adjustment made to account historical average + forecasted growt rates						
2017 Total		15	884	0	899	0.3	
2018	Other	29	1,141	0	1,170	0.5	EAMARE20161201111049217
Explanation:	Adjustment made to account historical average + forecasted growt rates						
2018 Total		29	1,141	0	1,170	0.5	
2019	Other	44	1,399	0	1,443	0.6	EAMARE20161201111134360
Explanation:	Adjustment made to account historical average + forecasted growt rates						
2019 Total		44	1,399	0	1,443	0.6	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00211.0
Category: F. NEW BUSINESS
Category-Sub: 2. OH RESIDENTIAL NB
Workpaper Group: 002110 - CONVERSION FROM OH-UG RULE 20B 20C

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	149	156	62	38	69
Non-Labor	1,091	586	1,828	2,094	1,851
NSE	0	0	0	0	0
Total	**1,240**	**741**	**1,890**	**2,132**	**1,921**
FTE	1.4	1.6	0.5	0.3	0.5
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	149	156	62	38	69
Non-Labor	1,091	586	1,828	2,094	1,851
NSE	0	0	0	0	0
Total	**1,240**	**741**	**1,890**	**2,132**	**1,921**
FTE	1.4	1.6	0.5	0.3	0.5
Vacation & Sick (Nominal $)					
Labor	22	25	10	6	11
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**22**	**25**	**10**	**6**	**11**
FTE	0.2	0.3	0.1	0.0	0.1
Escalation to 2016$					
Labor	19	13	3	1	0
Non-Labor	119	41	70	29	0
NSE	0	0	0	0	0
Total	**137**	**54**	**73**	**30**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	189	193	75	44	81
Non-Labor	1,210	627	1,898	2,124	1,851
NSE	0	0	0	0	0
Total	**1,399**	**820**	**1,973**	**2,167**	**1,932**
FTE	1.6	1.9	0.6	0.3	0.6

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00211.0
Category: F. NEW BUSINESS
Category-Sub: 2. OH RESIDENTIAL NB
Workpaper Group: 002110 - CONVERSION FROM OH-UG RULE 20B 20C

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 002110

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00211.0
Category:	F. NEW BUSINESS
Category-Sub:	2. OH RESIDENTIAL NB
Workpaper Group:	002110 - CONVERSION FROM OH-UG RULE 20B 20C
Workpaper Detail:	002110.001 - CONVERSION FROM OH-UG RULE 20B 20C- Non Collectible
In-Service Date:	Not Applicable

Description:

This project reflects SDG&E s portion of the costs for installing new underground facilities to replace existing overhead facilities for projects meeting the criteria for Rule 20B and 20C.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	131	145	160
Non-Labor	1,265	1,405	1,546
NSE	0	0	0
Total	**1,396**	**1,550**	**1,706**
FTE	1.3	1.5	1.6

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00211.0
Category:	F. NEW BUSINESS
Category-Sub:	2. OH RESIDENTIAL NB
Workpaper Group:	002110 - CONVERSION FROM OH-UG RULE 20B 20C
Workpaper Detail:	002110.002 - CONVERSION FROM OH-UG RULE 20B 20C - Collectible
In-Service Date:	Not Applicable

Description:

This project reflects SDG&E s portion of the costs for installing new underground facilities to replace existing overhead facilities for projects meeting the criteria for Rule 20B and 20C.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	1,161	1,278	1,395
NSE	0	0	0
Total	**1,161**	**1,278**	**1,395**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002150 - OH RESIDENTIAL NB

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00215.0
Category: F. NEW BUSINESS
Category-Sub: 3. OH NON-RESIDENTIAL NB
Workpaper Group: 002150 - OH RESIDENTIAL NB

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	24	34	25	28	13	42	51	54
Non-Labor	5-YR Average	374	350	459	472	360	705	855	907
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**399**	**384**	**484**	**500**	**373**	**747**	**906**	**961**
FTE	5-YR Average	0.1	0.3	0.2	0.2	0.1	0.2	0.5	0.5

Business Purpose:

This project is required for the extension of new overhead electric distribution systems to new residential electric customers requesting service from the Utility.

Physical Description:

This project provides for the extension of the overhead distribution system, including third wire bring ups and transmission under builds, to serve new residential customers.

Project Justification:

In accordance with the rules for the sale of electric energy, filed with and approved by the CPUC, electric facilities must be provided to qualified applicants.
"

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00215.0
Category:	F. NEW BUSINESS
Category-Sub:	3. OH NON-RESIDENTIAL NB
Workpaper Group:	002150 - OH RESIDENTIAL NB

Forecast Methodology:

Labor - 5-YR Average

5YR Avg. The volume of future overhead residential line extension work can be very difficult to predict. Unlike underground residential, customer requests for overhead line extensions can be sporadic. They can also vary dramatically in size and complexity. Actual net expenditures in this category over the past five years have been up and down. To estimate future requirements for residential overhead construction, an average was taken of the actual net expenditures over the last five years (normalized to 2016 dollar equivalents and including projected year-end figures for 2016). That amount was increased each year, 2017 through 2019, by applying growth factors derived from the SDG&E Construction Unit Forecast.

Non-Labor - 5-YR Average

5YR Avg. The volume of future overhead residential line extension work can be very difficult to predict. Unlike underground residential, customer requests for overhead line extensions can be sporadic. They can also vary dramatically in size and complexity. Actual net expenditures in this category over the past five years have been up and down. To estimate future requirements for residential overhead construction, an average was taken of the actual net expenditures over the last five years (normalized to 2016 dollar equivalents and including projected year-end figures for 2016). That amount was increased each year, 2017 through 2019, by applying growth factors derived from the SDG&E Construction Unit Forecast.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00215.0
Category: F. NEW BUSINESS
Category-Sub: 3. OH NON-RESIDENTIAL NB
Workpaper Group: 002150 - OH RESIDENTIAL NB

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	24	24	24	18	27	30	42	51	54
Non-Labor	5-YR Average	403	403	403	302	452	504	705	855	907
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**427**	**427**	**427**	**320**	**479**	**534**	**747**	**906**	**961**
FTE	5-YR Average	0.2	0.2	0.2	0.0	0.3	0.3	0.2	0.5	0.5

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	17	302	0	319	0.2	EAMARE20161127170550243
Explanation:	Adjustment made to account historical average + forecasted growth rate. Add Collectible 198						
2017 Total		17	302	0	319	0.2	
2018	Other	26	452	0	478	0.3	EAMARE20161127171959607
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectibel portion 242						
2018 Total		26	452	0	478	0.3	
2019	Other	29	504	0	533	0.3	EAMARE20161127172041480
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 257						
2019 Total		29	504	0	533	0.3	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00215.0
Category: F. NEW BUSINESS
Category-Sub: 3. OH NON-RESIDENTIAL NB
Workpaper Group: 002150 - OH RESIDENTIAL NB

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	19	27	21	24	11
Non-Labor	338	327	442	466	360
NSE	0	0	0	0	0
Total	**357**	**354**	**463**	**490**	**371**
FTE	0.1	0.3	0.2	0.2	0.1
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	19	27	21	24	11
Non-Labor	338	327	442	466	360
NSE	0	0	0	0	0
Total	**357**	**354**	**463**	**490**	**371**
FTE	0.1	0.3	0.2	0.2	0.1
Vacation & Sick (Nominal $)					
Labor	3	4	3	4	2
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**3**	**4**	**3**	**4**	**2**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	2	2	1	0	0
Non-Labor	37	23	17	6	0
NSE	0	0	0	0	0
Total	**39**	**25**	**18**	**7**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	24	34	25	28	13
Non-Labor	374	350	459	472	360
NSE	0	0	0	0	0
Total	**399**	**384**	**484**	**500**	**373**
FTE	0.1	0.3	0.2	0.2	0.1

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00215.0
Category: F. NEW BUSINESS
Category-Sub: 3. OH NON-RESIDENTIAL NB
Workpaper Group: 002150 - OH RESIDENTIAL NB

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 002150

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00215.0
Category: F. NEW BUSINESS
Category-Sub: 3. OH NON-RESIDENTIAL NB
Workpaper Group: 002150 - OH RESIDENTIAL NB
Workpaper Detail: 002150.001 - OH RESIDENTIAL NB

In-Service Date: Not Applicable

Description:

This project provides for the extension of the overhead distribution system, including third wire bring ups and transmission under builds, to serve new residential customers.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	42	51	54
Non-Labor	483	589	626
NSE	0	0	0
Total	**525**	**640**	**680**
FTE	0.2	0.5	0.5

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00215.0
Category: F. NEW BUSINESS
Category-Sub: 3. OH NON-RESIDENTIAL NB
Workpaper Group: 002150 - OH RESIDENTIAL NB
Workpaper Detail: 002150.002 - OH RESIDENTIAL NB - COLLECTIBLE

In-Service Date: Not Applicable

Description:

This project provides for the extension of the overhead distribution system, including third wire bring ups and transmission under builds, to serve new residential customers.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	222	266	281
NSE	0	0	0
Total	**222**	**266**	**281**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002160 - OH NON-RESIDENTIAL NB

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00216.0
Category: F. NEW BUSINESS
Category-Sub: 4. UG RESIDENTIAL NB
Workpaper Group: 002160 - OH NON-RESIDENTIAL NB

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	34	71	52	52	49	40	47	49
Non-Labor	5-YR Average	748	721	412	392	464	769	903	949
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**782**	**792**	**464**	**445**	**513**	**809**	**950**	**998**
FTE	5-YR Average	0.3	0.7	0.5	0.5	0.4	0.4	0.4	0.5

Business Purpose:

This project provides for the extension of the overhead electric distribution sstem, including third wire bring ups and transmission under builds, to serve new non-residential customers requesting service from the Utility.

Physical Description:

This project provides for the extension of the overhead distribution system, including third wire bring ups and transmission under builds, to serve new non-residential customers.

Project Justification:

In accordance with the rules for the sale of electric energy, filed with and approved by the CPUC, electric facilities must be provided to qualified applicants.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00216.0
Category:	F. NEW BUSINESS
Category-Sub:	4. UG RESIDENTIAL NB
Workpaper Group:	002160 - OH NON-RESIDENTIAL NB

Forecast Methodology:

Labor - 5-YR Average

5YR Avg. The volume of future overhead non-residential line extension work can be very difficult to predict. Unlike underground non-residential, customer requests for overhead line extensions can be sporadic. They can also vary dramatically in size and complexity. Actual net expenditures in this category over the past five years have varied significantly. To estimate future requirements for non-residential overhead construction, an average was taken of the actual net expenditures over the last five years (normalized to 2016 dollar equivalents and including projected year-end figures for 2016). That amount was increased each year, 2017 through 2019, by applying growth factors derived from the SDG&E Construction Unit Forecast.

Non-Labor - 5-YR Average

5YR Avg.The volume of future overhead non-residential line extension work can be very difficult to predict. Unlike underground non-residential, customer requests for overhead line extensions can be sporadic. They can also vary dramatically in size and complexity. Actual net expenditures in this category over the past five years have varied significantly. To estimate future requirements for non-residential overhead construction, an average was taken of the actual net expenditures over the last five years (normalized to 2016 dollar equivalents and including projected year-end figures for 2016). That amount was increased each year, 2017 through 2019, by applying growth factors derived from the SDG&E Construction Unit Forecast.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00216.0
Category: F. NEW BUSINESS
Category-Sub: 4. UG RESIDENTIAL NB
Workpaper Group: 002160 - OH NON-RESIDENTIAL NB

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	51	51	51	-11	-4	-2	40	47	49
Non-Labor	5-YR Average	547	547	547	222	356	402	769	903	949
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**598**	**598**	**598**	**211**	**352**	**400**	**809**	**950**	**998**
FTE	5-YR Average	0.5	0.5	0.5	-0.1	-0.1	0.0	0.4	0.4	0.5

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	-12	221	0	209	-0.1	EAMARE20161127174140307
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 121						
2017 Total		-12	221	0	209	-0.1	
2018	Other	-5	355	0	350	-0.1	EAMARE20161127174230810
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 142						
2018 Total		-5	355	0	350	-0.1	
2019	Other	-3	401	0	398	0.0	EAMARE20161127174300050
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 150						
2019 Total		-3	401	0	398	0.0	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00216.0
Category: F. NEW BUSINESS
Category-Sub: 4. UG RESIDENTIAL NB
Workpaper Group: 002160 - OH NON-RESIDENTIAL NB

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	27	57	43	45	42
Non-Labor	674	674	397	387	464
NSE	0	0	0	0	0
Total	**701**	**731**	**440**	**432**	**506**
FTE	0.3	0.6	0.4	0.4	0.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	27	57	43	45	42
Non-Labor	674	674	397	387	464
NSE	0	0	0	0	0
Total	**701**	**731**	**440**	**432**	**506**
FTE	0.3	0.6	0.4	0.4	0.3
Vacation & Sick (Nominal $)					
Labor	4	9	7	7	7
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**4**	**9**	**7**	**7**	**7**
FTE	0.0	0.1	0.1	0.1	0.1
Escalation to 2016$					
Labor	3	5	2	1	0
Non-Labor	73	47	15	5	0
NSE	0	0	0	0	0
Total	**77**	**52**	**17**	**6**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	34	71	52	52	49
Non-Labor	748	721	412	392	464
NSE	0	0	0	0	0
Total	**782**	**792**	**464**	**445**	**513**
FTE	0.3	0.7	0.5	0.5	0.4

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00216.0
Category: F. NEW BUSINESS
Category-Sub: 4. UG RESIDENTIAL NB
Workpaper Group: 002160 - OH NON-RESIDENTIAL NB

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 002160

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00216.0
Category: F. NEW BUSINESS
Category-Sub: 4. UG RESIDENTIAL NB
Workpaper Group: 002160 - OH NON-RESIDENTIAL NB
Workpaper Detail: 002160.001 - OH NON-RESIDENTIAL NB

In-Service Date: Not Applicable

Description:

This project provides for the extension of the overhead distribution system, including third wire bring ups and transmission under builds, to serve new non-residential customers.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	40	47	49
Non-Labor	641	754	792
NSE	0	0	0
Total	**681**	**801**	**841**
FTE	0.4	0.4	0.5

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00216.0
Category: F. NEW BUSINESS
Category-Sub: 4. UG RESIDENTIAL NB
Workpaper Group: 002160 - OH NON-RESIDENTIAL NB
Workpaper Detail: 002160.002 - OH NON-RESIDENTIAL NB - COLLECTIBLE

In-Service Date: Not Applicable

Description:

This project provides for the extension of the overhead distribution system, including third wire bring ups and transmission under builds, to serve new non-residential customers.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	128	149	157
NSE	0	0	0
Total	**128**	**149**	**157**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002170 - UG RESIDENTIAL NB

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00217.0
Category: F. NEW BUSINESS
Category-Sub: 5. UG NON-RESIDENTIAL NB
Workpaper Group: 002170 - UG RESIDENTIAL NB

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	487	550	504	562	415	634	773	824
Non-Labor	Base YR Rec	3,027	3,224	3,531	5,381	6,383	12,024	15,282	16,169
NSE	Base YR Rec	0	0	0	0	0	0	0	0
Total		**3,514**	**3,774**	**4,035**	**5,943**	**6,798**	**12,658**	**16,055**	**16,993**
FTE	Base YR Rec	4.0	4.8	4.4	5.2	3.5	6.0	7.4	7.3

Business Purpose:

This project is required to extend new underground electric distribution systems to new residential electric customers requesting service from the Utility..

Physical Description:

This project provides for the extension of the underground electric distribution system to serve new residential customers.

Project Justification:

In accordance with the rules for the sale of electric energy, filed with and approved by the CPUC, electric facilities must be provided to qualified applicants.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00217.0
Category:	F. NEW BUSINESS
Category-Sub:	5. UG NON-RESIDENTIAL NB
Workpaper Group:	002170 - UG RESIDENTIAL NB

Forecast Methodology:

Labor - Base YR Rec

Base YR (2016 recorded) - As the housing industry continues to recover from historic lows, the requirement for underground residential line extension work has continued to increase year over year. Unlike the sporadic nature of overhead line extension requirements, underground line extension requirements are easier to predict as virtually all new residential developments are required to be served by underground electric systems. As such, the year-end net expenditure for 2016 represents just how much this category has grown in recent years. Therefore, 2016's year-end net expenditure was used as a starting point to which annual increases were estimated for 2017 through Base Year-2019 by applying growth factors derived from the SDG&E Construction Unit Forecast.

Non-Labor - Base YR Rec

Base YR (2016 recorded) - As the housing industry continues to recover from historic lows, the requirement for underground residential line extension work has continued to increase year over year. Unlike the sporadic nature of overhead line extension requirements, underground line extension requirements are easier to predict as virtually all new residential developments are required to be served by underground electric systems. As such, the year-end net expenditure for 2016 represents just how much this category has grown in recent years. Therefore, 2016's year-end net expenditure was used as a starting point to which annual increases were estimated for 2017 through Base Year-2019 by applying growth factors derived from the SDG&E Construction Unit Forecast.

NSE - Base YR Rec

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00217.0
Category: F. NEW BUSINESS
Category-Sub: 5. UG NON-RESIDENTIAL NB
Workpaper Group: 002170 - UG RESIDENTIAL NB

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	414	414	414	220	359	410	634	773	824
Non-Labor	Base YR Rec	6,383	6,383	6,383	5,641	8,899	9,786	12,024	15,282	16,169
NSE	Base YR Rec	0	0	0	0	0	0	0	0	0
Total		**6,797**	**6,797**	**6,797**	**5,861**	**9,258**	**10,196**	**12,658**	**16,055**	**16,993**
FTE	Base YR Rec	3.5	3.5	3.5	2.5	3.9	3.8	6.0	7.4	7.3

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	219	5,641	0	5,860	2.5	EAMARE20161127163002200
Explanation:	Adjustment made to account historical average + forecasted growt rates						
2017 Total		219	5,641	0	5,860	2.5	
2018	Other	358	8,899	0	9,257	3.9	EAMARE20161127163455363
Explanation:	Adjustment made to account historical average + forecasted growth rate						
2018 Total		358	8,899	0	9,257	3.9	
2019	Other	409	9,786	0	10,195	3.8	EAMARE20161127163531283
Explanation:	Adjustment made to account historical average + forecasted growth rate						
2019 Total		409	9,786	0	10,195	3.8	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00217.0
Category: F. NEW BUSINESS
Category-Sub: 5. UG NON-RESIDENTIAL NB
Workpaper Group: 002170 - UG RESIDENTIAL NB

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	384	444	419	481	356
Non-Labor	2,729	3,012	3,400	5,307	6,383
NSE	0	0	0	0	0
Total	**3,113**	**3,456**	**3,819**	**5,787**	**6,739**
FTE	3.4	4.1	3.7	4.4	3.0
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	384	444	419	481	356
Non-Labor	2,729	3,012	3,400	5,307	6,383
NSE	0	0	0	0	0
Total	**3,113**	**3,456**	**3,819**	**5,787**	**6,739**
FTE	3.4	4.1	3.7	4.4	3.0
Vacation & Sick (Nominal $)					
Labor	56	70	67	74	59
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**56**	**70**	**67**	**74**	**59**
FTE	0.6	0.7	0.7	0.8	0.5
Escalation to 2016$					
Labor	48	36	19	8	0
Non-Labor	298	212	131	74	0
NSE	0	0	0	0	0
Total	**345**	**248**	**149**	**81**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	487	550	504	562	415
Non-Labor	3,027	3,224	3,531	5,381	6,383
NSE	0	0	0	0	0
Total	**3,514**	**3,774**	**4,035**	**5,943**	**6,798**
FTE	4.0	4.8	4.4	5.2	3.5

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00217.0
Category: F. NEW BUSINESS
Category-Sub: 5. UG NON-RESIDENTIAL NB
Workpaper Group: 002170 - UG RESIDENTIAL NB

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 002170

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00217.0
Category: F. NEW BUSINESS
Category-Sub: 5. UG NON-RESIDENTIAL NB
Workpaper Group: 002170 - UG RESIDENTIAL NB
Workpaper Detail: 002170.001 - UG RESIDENTIAL NB

In-Service Date: Not Applicable

Description:

This project provides for the extension of the underground distribution system to serve new residential customers.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	634	773	824
Non-Labor	8,686	11,515	12,246
NSE	0	0	0
Total	**9,320**	**12,288**	**13,070**
FTE	6.0	7.4	7.3

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00217.0
Category:	F. NEW BUSINESS
Category-Sub:	5. UG NON-RESIDENTIAL NB
Workpaper Group:	002170 - UG RESIDENTIAL NB
Workpaper Detail:	002170.002 - UG RESIDENTIAL NB
In-Service Date:	Not Applicable

Description:

This project provides for the extension of the underground distribution system to serve new residential customers.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	3,338	3,767	3,923
NSE	0	0	0
Total	**3,338**	**3,767**	**3,923**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002180 - UG NON-RESIDENTIAL NB

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00218.0
Category: F. NEW BUSINESS
Category-Sub: 6. NEW BUSINESS INFRASTRUCTURE
Workpaper Group: 002180 - UG NON-RESIDENTIAL NB

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	445	488	591	539	286	469	568	598
Non-Labor	Base YR Rec	2,410	2,069	2,560	3,276	3,318	5,782	6,934	7,279
NSE	Base YR Rec	0	0	0	0	0	0	0	0
Total		**2,854**	**2,557**	**3,151**	**3,815**	**3,604**	**6,251**	**7,502**	**7,877**
FTE	Base YR Rec	3.4	4.0	4.2	4.1	2.0	4.5	5.5	5.8

Business Purpose:

This project is required to extend new underground electric distribution systems to new non-residential electric customers requesting service from the utility.

Physical Description:

This project provides for the extension of the underground electric distribution system to serve new non-residential customers.

Project Justification:

In accordance with the rules for the sale of electric energy, filed with and approved by the CPUC, electric facilities must be provided to qualified applicants.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00218.0
Category:	F. NEW BUSINESS
Category-Sub:	6. NEW BUSINESS INFRASTRUCTURE
Workpaper Group:	002180 - UG NON-RESIDENTIAL NB

Forecast Methodology:

Labor - Base YR Rec

Base Year (2016) Recorded - As the economy continues to recover from historic lows, the requirement for underground non-residential line extension work has increased. Unlike the sporadic nature of overhead line extension requirements, underground line extension requirements are somewhat easier to predict as virtually all new non-residential development (retail plazas, office buildings, medical facilities, individual commercial installations, etc.)are required to be served by underground electric systems. As such, the year-end net expenditure for 2016 is a good indication of the requirements of this category. Therefore, 2016's year-end net expenditure was used as a starting point to which annual increases were estimated for 2017 through 2019 by applying growth factors derived from the SDG&E Construction Unit Forecast.

Non-Labor - Base YR Rec

Base Year (2016) Recorded - As the economy continues to recover from historic lows, the requirement for underground non-residential line extension work has increased. Unlike the sporadic nature of overhead line extension requirements, underground line extension requirements are somewhat easier to predict as virtually all new non-residential development (retail plazas, office buildings, medical facilities, individual commercial installations, etc.)are required to be served by underground electric systems. As such, the year-end net expenditure for 2016 is a good indication of the requirements of this category. Therefore, 2016's year-end net expenditure was used as a starting point to which annual increases were estimated for 2017 through 2019 by applying growth factors derived from the SDG&E Construction Unit Forecast.

NSE - Base YR Rec

n/a

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00218.0
Category: F. NEW BUSINESS
Category-Sub: 6. NEW BUSINESS INFRASTRUCTURE
Workpaper Group: 002180 - UG NON-RESIDENTIAL NB

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	285	285	285	184	283	313	469	568	598
Non-Labor	Base YR Rec	3,318	3,318	3,318	2,464	3,616	3,961	5,782	6,934	7,279
NSE	Base YR Rec	0	0	0	0	0	0	0	0	0
Total		**3,603**	**3,603**	**3,603**	**2,648**	**3,899**	**4,274**	**6,251**	**7,502**	**7,877**
FTE	Base YR Rec	2.0	2.0	2.0	2.5	3.5	3.8	4.5	5.5	5.8

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	183	2,464	0	2,647	2.5	EAMARE20161127175015060
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 1576						
2017 Total		183	2,464	0	2,647	2.5	
2018	Other	282	3,616	0	3,898	3.5	EAMARE20161127175041153
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 3,616						
2018 Total		282	3,616	0	3,898	3.5	
2019	Other	312	3,961	0	4,273	3.8	EAMARE20161127175124060
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 1,985						
2019 Total		312	3,961	0	4,273	3.8	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00218.0
Category: F. NEW BUSINESS
Category-Sub: 6. NEW BUSINESS INFRASTRUCTURE
Workpaper Group: 002180 - UG NON-RESIDENTIAL NB

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	350	394	491	460	245
Non-Labor	2,173	1,933	2,465	3,231	3,318
NSE	0	0	0	0	0
Total	**2,523**	**2,327**	**2,956**	**3,692**	**3,563**
FTE	2.9	3.4	3.6	3.5	1.7
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	350	394	491	460	245
Non-Labor	2,173	1,933	2,465	3,231	3,318
NSE	0	0	0	0	0
Total	**2,523**	**2,327**	**2,956**	**3,692**	**3,563**
FTE	2.9	3.4	3.6	3.5	1.7
Vacation & Sick (Nominal $)					
Labor	51	62	78	71	41
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**51**	**62**	**78**	**71**	**41**
FTE	0.5	0.6	0.6	0.6	0.3
Escalation to 2016$					
Labor	44	32	22	7	0
Non-Labor	237	136	95	45	0
NSE	0	0	0	0	0
Total	**281**	**168**	**117**	**52**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	445	488	591	539	286
Non-Labor	2,410	2,069	2,560	3,276	3,318
NSE	0	0	0	0	0
Total	**2,854**	**2,557**	**3,151**	**3,815**	**3,604**
FTE	3.4	4.0	4.2	4.1	2.0

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00218.0
Category: F. NEW BUSINESS
Category-Sub: 6. NEW BUSINESS INFRASTRUCTURE
Workpaper Group: 002180 - UG NON-RESIDENTIAL NB

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 002180

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00218.0
Category:	F. NEW BUSINESS
Category-Sub:	6. NEW BUSINESS INFRASTRUCTURE
Workpaper Group:	002180 - UG NON-RESIDENTIAL NB
Workpaper Detail:	002180.001 - UG NON-RESIDENTIAL NB
In-Service Date:	Not Applicable

Description:

This project provides for the extension of the underground distribution system, to serve new non-residential customers.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	469	568	598
Non-Labor	4,186	5,023	5,274
NSE	0	0	0
Total	**4,655**	**5,591**	**5,872**
FTE	4.5	5.5	5.8

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00218.0
Category:	F. NEW BUSINESS
Category-Sub:	6. NEW BUSINESS INFRASTRUCTURE
Workpaper Group:	002180 - UG NON-RESIDENTIAL NB
Workpaper Detail:	002180.002 - UG NON-RESIDENTIAL NB - COLLECTIBLE
In-Service Date:	Not Applicable

Description:

This project provides for the extension of the underground distribution system, to serve new non-residential customers.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	1,596	1,911	2,005
NSE	0	0	0
Total	**1,596**	**1,911**	**2,005**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002190 - NEW BUSINESS INFRASTRUCTURE

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00219.0
Category: F. NEW BUSINESS
Category-Sub: 7. NEW SERVICE INSTALLATIONS
Workpaper Group: 002190 - NEW BUSINESS INFRASTRUCTURE

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	611	537	488	552	355	539	656	694
Non-Labor	5-YR Average	3,623	4,034	3,631	6,355	5,940	6,875	8,288	8,743
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**4,233**	**4,571**	**4,119**	**6,908**	**6,296**	**7,414**	**8,944**	**9,437**
FTE	5-YR Average	5.0	4.6	4.1	4.5	2.7	5.4	6.6	6.9

Business Purpose:

This project is required to provide facilities for new electric customers to be served from both the overhead and underground distibution system as outlined in Project Description.

Physical Description:

This project provides for the following: 1) Installation of new underground distribution systems in conjuction with the development of land and new streets. 2) Retrofitting the existing system to comply with current standards when required to serve new customers. 3) Installation of street light systems 4) Modification of the existing electric system (reconductors, cutovers, load transfers, neutral bringups) to meet capacity requirements when necessitated by new customer projects. 5) Installation of new distribution systems to provide alternate service or special facilities under rule 2. 6) Installation of electric distribution facilities in anticipation of future utility needs.

Project Justification:

In accordance with the rules for the sale of electric energy, filed with and approved by the CPUC, electric facilities must be provided to qualified applicants.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00219.0
Category:	F. NEW BUSINESS
Category-Sub:	7. NEW SERVICE INSTALLATIONS
Workpaper Group:	002190 - NEW BUSINESS INFRASTRUCTURE

Forecast Methodology:

Labor - 5-YR Average

5 Yr Avg- Projects under 219 provide infrastructure support consistent with activities in the other line extension categories. That includes overhead and underground, residential and non-residential as needed. Some 219 projects can be very large and can take a long time to complete. That makes the timing of customer payments inconsistent with the timing of the work. As such, the net expenditure varies from year to year, sometimes significantly. The year-end net expenditure for 2016 was unusually low because of that very reason. So, an average was taken of the actual net expenditures over the last five years (normalized to 2016 dollar equivalents using escalation factors provided by Global Insights). That amount was increased each year, 2017 through 2019, by applying growth factors derived from the SDG&E Construction Unit Forecast.

Non-Labor - 5-YR Average

5 Yr Avg- Projects under 219 provide infrastructure support consistent with activities in the other line extension categories. That includes overhead and underground, residential and non-residential as needed. Some 219 projects can be very large and can take a long time to complete. That makes the timing of customer payments inconsistent with the timing of the work. As such, the net expenditure varies from year to year, sometimes significantly. The year-end net expenditure for 2016 was unusually low because of that very reason. So, an average was taken of the actual net expenditures over the last five years (normalized to 2016 dollar equivalents using escalation factors provided by Global Insights). That amount was increased each year, 2017 through 2019, by applying growth factors derived from the SDG&E Construction Unit Forecast.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00219.0
Category: F. NEW BUSINESS
Category-Sub: 7. NEW SERVICE INSTALLATIONS
Workpaper Group: 002190 - NEW BUSINESS INFRASTRUCTURE

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	508	508	508	31	148	186	539	656	694
Non-Labor	5-YR Average	4,716	4,716	4,716	2,159	3,572	4,027	6,875	8,288	8,743
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**5,224**	**5,224**	**5,224**	**2,190**	**3,720**	**4,213**	**7,414**	**8,944**	**9,437**
FTE	5-YR Average	4.2	4.2	4.2	1.2	2.4	2.7	5.4	6.6	6.9

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	30	2,158	0	2,188	1.2	EAMARE20161127180353420
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 1,585						
2017 Total		30	2,158	0	2,188	1.2	
2018	Other	147	3,571	0	3,718	2.4	EAMARE20161127180434010
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 1,918						
2018 Total		147	3,571	0	3,718	2.4	
2019	Other	185	4,026	0	4,211	2.7	EAMARE20161127180506547
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 2,026						
2019 Total		185	4,026	0	4,211	2.7	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00219.0
Category: F. NEW BUSINESS
Category-Sub: 7. NEW SERVICE INSTALLATIONS
Workpaper Group: 002190 - NEW BUSINESS INFRASTRUCTURE

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	481	433	405	472	305
Non-Labor	3,267	3,768	3,496	6,268	5,940
NSE	0	0	0	0	0
Total	**3,748**	**4,201**	**3,902**	**6,740**	**6,245**
FTE	4.3	3.9	3.5	3.8	2.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	481	433	405	472	305
Non-Labor	3,267	3,768	3,496	6,268	5,940
NSE	0	0	0	0	0
Total	**3,748**	**4,201**	**3,902**	**6,740**	**6,245**
FTE	4.3	3.9	3.5	3.8	2.3
Vacation & Sick (Nominal $)					
Labor	70	69	65	73	51
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**70**	**69**	**65**	**73**	**51**
FTE	0.7	0.7	0.6	0.7	0.4
Escalation to 2016$					
Labor	60	35	18	8	0
Non-Labor	356	265	134	87	0
NSE	0	0	0	0	0
Total	**416**	**301**	**152**	**95**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	611	537	488	552	355
Non-Labor	3,623	4,034	3,631	6,355	5,940
NSE	0	0	0	0	0
Total	**4,233**	**4,571**	**4,119**	**6,908**	**6,296**
FTE	5.0	4.6	4.1	4.5	2.7

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00219.0
Category: F. NEW BUSINESS
Category-Sub: 7. NEW SERVICE INSTALLATIONS
Workpaper Group: 002190 - NEW BUSINESS INFRASTRUCTURE

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 002190

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00219.0
Category:	F. NEW BUSINESS
Category-Sub:	7. NEW SERVICE INSTALLATIONS
Workpaper Group:	002190 - NEW BUSINESS INFRASTRUCTURE
Workpaper Detail:	002190.001 - NEW BUSINESS INFRASTRUCTURE
In-Service Date:	Not Applicable

Description:

This project provides for the following: 1) Installation of new underground distribution systems in conjuction with the development of land and new streets. 2) Retrofitting the existing system to comply with current standards when required to serve new customers. 3) Installation of street light systems 4) Modification of the existing electric system (reconductors, cutovers, load transfers, neutral bringups) to meet capacity requirements when necessitated by new customer projects. 5) Installation of new distribution systems to provide alternate service or special facilities under rule 2. 6) Installation of electric distribution facilities in anticipation of future utility needs.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	539	656	694
Non-Labor	5,126	6,206	6,553
NSE	0	0	0
Total	**5,665**	**6,862**	**7,247**
FTE	5.4	6.6	6.9

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00219.0
Category:	F. NEW BUSINESS
Category-Sub:	7. NEW SERVICE INSTALLATIONS
Workpaper Group:	002190 - NEW BUSINESS INFRASTRUCTURE
Workpaper Detail:	002190.002 - NEW BUSINESS INFRASTRUCTURE - COLLECTIBLE
In-Service Date:	Not Applicable

Description:

This project provides for the following: 1) Installation of new underground distribution systems in conjuction with the development of land and new streets. 2) Retrofitting the existing system to comply with current standards when required to serve new customers. 3) Installation of street light systems 4) Modification of the existing electric system (reconductors, cutovers, load transfers, neutral bringups) to meet capacity requirements when necessitated by new customer projects. 5) Installation of new distribution systems to provide alternate service or special facilities under rule 2. 6) Installation of electric distribution facilities in anticipation of future utility needs.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	0
Non-Labor	1,749	2,082	2,190
NSE	0	0	0
Total	**1,749**	**2,082**	**2,190**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002240 - NEW SERVICE INSTALLATIONS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00224.0
Category: F. NEW BUSINESS
Category-Sub: 8. CUSTOMER REQUESTED UPGRADES AND SERVICES
Workpaper Group: 002240 - NEW SERVICE INSTALLATIONS

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	384	342	403	456	689	566	676	710
Non-Labor	Base YR Rec	3,327	3,505	3,586	3,956	4,057	4,385	5,331	5,626
NSE	Base YR Rec	0	0	0	0	0	0	0	0
Total		**3,711**	**3,848**	**3,989**	**4,412**	**4,746**	**4,951**	**6,007**	**6,336**
FTE	Base YR Rec	3.1	2.7	3.3	3.6	5.0	5.0	6.1	6.5

Business Purpose:

This project is required to provide electric service to new customers from new or existing electric distribution systems.

Physical Description:

This project provides for the installation of new overhead and underground electric services for new customers. The installation of distribution facilities is to be installed on Budgets 215, 216, 217, 218 or 219.

Project Justification:

In accordance with the rules for the sale of electric energy, filed with and approved by the CPUC, electric facilities must be provided to qualified applicants.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00224.0
Category:	F. NEW BUSINESS
Category-Sub:	8. CUSTOMER REQUESTED UPGRADES AND SERVICES
Workpaper Group:	002240 - NEW SERVICE INSTALLATIONS

Forecast Methodology:

Labor - Base YR Rec

Base Yr (2016) Recorded - The volume of electric service work (services only, no distribution) has been increasing steadily over the past few years with an improved economy and a resurgence of the construction industry. The year-end net expenditure for 2016 is a good indication of current requirements to support this category. To estimate future requirements for service work, 2016's year-end net expenditure was used as a starting point to which annual increases were estimated for 2017 through 2019 by applying growth factors derived from the SDG&E Construction Unit Forecast.

Non-Labor - Base YR Rec

Base Yr (2016) Recorded - The volume of electric service work (services only, no distribution) has been increasing steadily over the past few years with an improved economy and a resurgence of the construction industry. The year-end net expenditure for 2016 is a good indication of current requirements to support this category. To estimate future requirements for service work, 2016's year-end net expenditure was used as a starting point to which annual increases were estimated for 2017 through 2019 by applying growth factors derived from the SDG&E Construction Unit Forecast.

NSE - Base YR Rec

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00224.0
Category: F. NEW BUSINESS
Category-Sub: 8. CUSTOMER REQUESTED UPGRADES AND SERVICES
Workpaper Group: 002240 - NEW SERVICE INSTALLATIONS

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	689	689	689	-123	-13	21	566	676	710
Non-Labor	Base YR Rec	4,056	4,056	4,056	329	1,275	1,570	4,385	5,331	5,626
NSE	Base YR Rec	0	0	0	0	0	0	0	0	0
Total		**4,745**	**4,745**	**4,745**	**206**	**1,262**	**1,591**	**4,951**	**6,007**	**6,336**
FTE	Base YR Rec	5.0	5.0	5.0	0.0	1.1	1.5	5.0	6.1	6.5

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	-123	328	0	205	0.0	EAMARE20161127181450847
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 307						
2017 Total		-123	328	0	205	0.0	
2018	Other	-13	1,274	0	1,261	1.1	EAMARE20161127181527567
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 370						
2018 Total		-13	1,274	0	1,261	1.1	
2019	Other	21	1,569	0	1,590	1.5	EAMARE20161127181545800
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 1,569						
2019 Total		21	1,569	0	1,590	1.5	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00224.0
Category: F. NEW BUSINESS
Category-Sub: 8. CUSTOMER REQUESTED UPGRADES AND SERVICES
Workpaper Group: 002240 - NEW SERVICE INSTALLATIONS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	303	276	334	389	591
Non-Labor	3,000	3,275	3,454	3,902	4,057
NSE	0	0	0	0	0
Total	**3,302**	**3,551**	**3,788**	**4,292**	**4,648**
FTE	2.7	2.3	2.8	3.1	4.2
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	303	276	334	389	591
Non-Labor	3,000	3,275	3,454	3,902	4,057
NSE	0	0	0	0	0
Total	**3,302**	**3,551**	**3,788**	**4,292**	**4,648**
FTE	2.7	2.3	2.8	3.1	4.2
Vacation & Sick (Nominal $)					
Labor	44	44	53	60	98
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**44**	**44**	**53**	**60**	**98**
FTE	0.4	0.4	0.5	0.5	0.8
Escalation to 2016$					
Labor	38	23	15	6	0
Non-Labor	327	231	133	54	0
NSE	0	0	0	0	0
Total	**365**	**253**	**148**	**60**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	384	342	403	456	689
Non-Labor	3,327	3,505	3,586	3,956	4,057
NSE	0	0	0	0	0
Total	**3,711**	**3,848**	**3,989**	**4,412**	**4,746**
FTE	3.1	2.7	3.3	3.6	5.0

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00224.0
Category: F. NEW BUSINESS
Category-Sub: 8. CUSTOMER REQUESTED UPGRADES AND SERVICES
Workpaper Group: 002240 - NEW SERVICE INSTALLATIONS

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 002240

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00224.0
Category:	F. NEW BUSINESS
Category-Sub:	8. CUSTOMER REQUESTED UPGRADES AND SERVICES
Workpaper Group:	002240 - NEW SERVICE INSTALLATIONS
Workpaper Detail:	002240.001 - NEW SERVICE INSTALLATIONS
In-Service Date:	Not Applicable

Description:

This project provides for the installation of new overhead and underground electric services for new customers. The installation of distribution facilities is to be installed on Budgets 215, 216, 217, 218 or 219.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	566	676	710
Non-Labor	4,359	5,242	5,518
NSE	0	0	0
Total	**4,925**	**5,918**	**6,228**
FTE	5.0	6.1	6.5

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00224.0
Category:	F. NEW BUSINESS
Category-Sub:	8. CUSTOMER REQUESTED UPGRADES AND SERVICES
Workpaper Group:	002240 - NEW SERVICE INSTALLATIONS
Workpaper Detail:	002240.002 - NEW SERVICE INSTALLATIONS - COLLECTIBLE
In-Service Date:	Not Applicable

Description:

This project provides for the installation of new overhead and underground electric services for new customers. The installation of distribution facilities is to be installed on Budgets 215, 216, 217, 218 or 219.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	0
Non-Labor	26	89	108
NSE	0	0	0
Total	**26**	**89**	**108**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002250 - CUSTOMER REQUESTED UPGRADES AND SERVICES

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00225.0
Category: F. NEW BUSINESS
Category-Sub: 9. TRANSFORMER & METER INSTALLATIONS
Workpaper Group: 002250 - CUSTOMER REQUESTED UPGRADES AND SERVICES

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	1,283	1,198	1,679	1,909	1,535	1,195	1,306	1,440
Non-Labor	5-YR Average	6,427	7,284	7,976	10,729	10,333	7,442	8,081	8,848
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**7,711**	**8,482**	**9,655**	**12,637**	**11,868**	**8,637**	**9,387**	**10,288**
FTE	5-YR Average	9.9	9.2	12.7	15.2	11.4	11.8	12.9	14.2

Business Purpose:

This project is required to replace, relocate, rearrange or remove existing electric distribution and service facilities as requested by customers.

Physical Description:

This provides for the following: 1) Costs associated with removing, replacing, relocating or rearranging existing electric distribution facilities at the customer's request, including joint utility requests. 2) Costs associated with modifying the existing electric distribution system as required to meet the customer's capacity needs and accommodate customer upgrades in service. 3) Costs associated with electric service replacements, rearrangements, and removals due to customer request or upgrade in service. 4) Costs associated with the replacement of customer-owned distribution systems in mobile home parks.

Project Justification:

In accordance with the rules for the sale of electric energy, filed with and approved by the CPUC, modification to existing electric facilities may be required due to customer request and in conjunction with new business projects

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00225.0
Category:	F. NEW BUSINESS
Category-Sub:	9. TRANSFORMER & METER INSTALLATIONS
Workpaper Group:	002250 - CUSTOMER REQUESTED UPGRADES AND SERVICES

Forecast Methodology:

Labor - 5-YR Average

5-YR Average - – Net expenditures for customer requested relocation, rearrangements and removals have been up and down over the past 5 years. Up one year, down the next. However, when normalized to 2016 equivalent dollars, the variance is not substantial. Due to the large volume of customer payments received in 2016 for work that has yet to be performed, the net expenditure for 2016 is artificially low. Given the volatile nature of this type of customer requested work, an average was taken of the last five years of actual net expenditures (normalized to 2016 dollar equivalents using escalation factors provided by Global Insights). That average was increased by 10% for 2017 and increased again by 10% per year for each successive year through 2019.

Non-Labor - 5-YR Average

5-YR Average - – Net expenditures for customer requested relocation, rearrangements and removals have been up and down over the past 5 years. Up one year, down the next. However, when normalized to 2016 equivalent dollars, the variance is not substantial. Due to the large volume of customer payments received in 2016 for work that has yet to be performed, the net expenditure for 2016 is artificially low. Given the volatile nature of this type of customer requested work, an average was taken of the last five years of actual net expenditures (normalized to 2016 dollar equivalents using escalation factors provided by Global Insights). That average was increased by 10% for 2017 and increased again by 10% per year for each successive year through 2019.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00225.0
Category: F. NEW BUSINESS
Category-Sub: 9. TRANSFORMER & METER INSTALLATIONS
Workpaper Group: 002250 - CUSTOMER REQUESTED UPGRADES AND SERVICES

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	1,520	1,520	1,520	-325	-214	-80	1,195	1,306	1,440
Non-Labor	5-YR Average	8,549	8,549	8,549	-1,107	-468	299	7,442	8,081	8,848
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**10,069**	**10,069**	**10,069**	**-1,432**	**-682**	**219**	**8,637**	**9,387**	**10,288**
FTE	5-YR Average	11.7	11.7	11.7	0.1	1.2	2.5	11.8	12.9	14.2

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	-326	-1,108	0	-1,434	0.1	EAMARE20161202110313783
Explanation:	Adjustment made to account historical average + forecasted growth rates						
2017 Total		-326	-1,108	0	-1,434	0.1	
2018	Other	-215	-469	0	-684	1.2	EAMARE20161202110535777
Explanation:	Adjustment made to account historical average + forecasted growth rates						
2018 Total		-215	-469	0	-684	1.2	
2019	Other	-81	298	0	217	2.5	EAMARE20161202110653080
Explanation:	Adjustment made to account historical average + forecasted growth rates						
2019 Total		-81	298	0	217	2.5	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00225.0
Category: F. NEW BUSINESS
Category-Sub: 9. TRANSFORMER & METER INSTALLATIONS
Workpaper Group: 002250 - CUSTOMER REQUESTED UPGRADES AND SERVICES

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	1,011	966	1,394	1,631	1,316
Non-Labor	5,796	6,804	7,681	10,582	10,333
NSE	0	0	0	0	0
Total	**6,806**	**7,771**	**9,075**	**12,212**	**11,650**
FTE	8.5	7.8	10.8	13.0	9.7
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	1,011	966	1,394	1,631	1,316
Non-Labor	5,796	6,804	7,681	10,582	10,333
NSE	0	0	0	0	0
Total	**6,806**	**7,771**	**9,075**	**12,212**	**11,650**
FTE	8.5	7.8	10.8	13.0	9.7
Vacation & Sick (Nominal $)					
Labor	146	153	223	252	218
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**146**	**153**	**223**	**252**	**218**
FTE	1.4	1.4	1.9	2.2	1.7
Escalation to 2016$					
Labor	126	79	62	26	0
Non-Labor	632	479	295	147	0
NSE	0	0	0	0	0
Total	**758**	**558**	**357**	**173**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	1,283	1,198	1,679	1,909	1,535
Non-Labor	6,427	7,284	7,976	10,729	10,333
NSE	0	0	0	0	0
Total	**7,711**	**8,482**	**9,655**	**12,637**	**11,868**
FTE	9.9	9.2	12.7	15.2	11.4

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00225.0
Category: F. NEW BUSINESS
Category-Sub: 9. TRANSFORMER & METER INSTALLATIONS
Workpaper Group: 002250 - CUSTOMER REQUESTED UPGRADES AND SERVICES

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 002250

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00225.0
Category:	F. NEW BUSINESS
Category-Sub:	9. TRANSFORMER & METER INSTALLATIONS
Workpaper Group:	002250 - CUSTOMER REQUESTED UPGRADES AND SERVICES
Workpaper Detail:	002250.001 - CUSTOMER REQUESTED UPGRADES AND SERVICES
In-Service Date:	Not Applicable

Description:

This provides for the following: 1) Costs associated with removing, replacing, relocating or rearranging existing electric distribution facilities at the customer's request, including joint utility requests. 2) Costs associated with modifying the existing electric distribution system as required to meet the customer's capacity needs and accommodate customer upgrades in service. 3) Costs associated with electric service replacements, rearrangements, and removals due to customer request or upgrade in service. 4) Costs associated with the replacement of customer-owned distribution systems
in mobile home parks.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1,195	1,306	1,440
Non-Labor	3,935	4,306	4,751
NSE	0	0	0
Total	**5,130**	**5,612**	**6,191**
FTE	11.8	12.9	14.2

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00225.0
Category:	F. NEW BUSINESS
Category-Sub:	9. TRANSFORMER & METER INSTALLATIONS
Workpaper Group:	002250 - CUSTOMER REQUESTED UPGRADES AND SERVICES
Workpaper Detail:	002250.002 - CUSTOMER REQUESTED UPGRADES AND SERVICES - COLLECTIBLE
In-Service Date:	Not Applicable

Description:

COLLECTIBLE

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	3,507	3,775	4,097
NSE	0	0	0
Total	**3,507**	**3,775**	**4,097**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002350 - TRANSFORMER & METER INSTALLATIONS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00235.0
Category: F. NEW BUSINESS
Category-Sub: 10. Mid-Coast Trolley Extension 11A
Workpaper Group: 002350 - TRANSFORMER & METER INSTALLATIONS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	4-YR Average	1,506	1,305	1,146	933	1,135	402	402	402
Non-Labor	4-YR Average	4,019	2,824	3,078	3,645	2,392	3,102	3,102	3,102
NSE	4-YR Average	0	0	0	0	0	0	0	0
Total		**5,525**	**4,129**	**4,223**	**4,578**	**3,527**	**3,504**	**3,504**	**3,504**
FTE	4-YR Average	15.1	13.9	12.1	10.0	10.5	3.0	3.0	3.0

Business Purpose:

This project provides for the following: 1) The labor, transportation and minor material cost associated with the installation of new line transformers, including the replacement of existing transformers. 2) The labor and transportation cost associated with the installation of new electric meters. 3) The labor and transportation costs associated with switching for capital jobs, excluding parallel or transmission switching. 4) All costs associated with the handling & loading of retired equipment, including PCB contaminated line equipment. 5) Salvage costs associated with the disposition of distribution line equipment that is being retired or scrapped, including PCB contaminated line equipment. 6) Costs associated with the removal of transformers ultimately scrapped or sold and subsequently transferred from Accounts 583.3 (Remove Overhead Transformers) and 584.2 (Remove Underground Transformers) to Capital Account 108.4

Physical Description:

This project provides for the following: 1) The labor, transportation and minor material cost associated with the installation of new line transformers, including the replacement of existing transformers. 2) The labor and transportation cost associated with the installation of new electric meters. 3) The labor and transportation costs associated with switching for capital jobs, excluding parallel or transmission switching. 4) All costs associated with the handling & loading of retired equipment, including PCB contaminated line equipment. 5) Salvage costs associated with the disposition of distribution line equipment that is being retired or scrapped, including PCB contaminated line equipment. 6) Costs associated with the removal of transformers ultimately scrapped or sold and subsequently transferred from Accounts 583.3 (Remove Overhead Transformers) and 584.2 (Remove Underground Transformers) to Capital Account 108.4

Project Justification:

In accordance with the rules for the sale of electric energy, filed with and approved by the CPUC, modification to existing electric facilities may be required due to customer request and in conjunction with new business projects.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00235.0
Category:	F. NEW BUSINESS
Category-Sub:	10. Mid-Coast Trolley Extension 11A
Workpaper Group:	002350 - TRANSFORMER & METER INSTALLATIONS

Forecast Methodology:

Labor - 4-YR Average

– With the exception of 2012, there has been little variance in the net expenditure per year over the last five years (past year expenditures normalized to 2016 equivalent dollars). The biggest change of late that is expected to cause upward pressure to 235 is in the way SDG&E accounts for transformer labor. Since SDG&E no longer refurbishes and redeploys existing transformers, all labor for transformer installation and removal will now be capital. There will no longer be an O&M component. The net effect of that change is expected to add about $1 million to the 235 (fully loaded). To project future requirements for 235, an average was taken of the actual net expenditures over the last four years (normalized to 2016 dollar equivalents and including the projected year-end figures for 2016). Four years was chosen because 2012 was unusually high and not consistent with the ensuing years. The resulting figure was increased by $1 million (fully loaded) and used to cover requirements for 2017 through 2019 without any annual increase.

Non-Labor - 4-YR Average

– With the exception of 2012, there has been little variance in the net expenditure per year over the last five years (past year expenditures normalized to 2016 equivalent dollars). The biggest change of late that is expected to cause upward pressure to 235 is in the way SDG&E accounts for transformer labor. Since SDG&E no longer refurbishes and redeploys existing transformers, all labor for transformer installation and removal will now be capital. There will no longer be an O&M component. The net effect of that change is expected to add about $1 million to the 235 (fully loaded). To project future requirements for 235, an average was taken of the actual net expenditures over the last four years (normalized to 2016 dollar equivalents and including the projected year-end figures for 2016). Four years was chosen because 2012 was unusually high and not consistent with the ensuing years. The resulting figure was increased by $1 million (fully loaded) and used to cover requirements for 2017 through 2019 without any annual increase.

NSE - 4-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00235.0
Category: F. NEW BUSINESS
Category-Sub: 10. Mid-Coast Trolley Extension 11A
Workpaper Group: 002350 - TRANSFORMER & METER INSTALLATIONS

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	4-YR Average	1,129	1,129	1,129	-727	-727	-727	402	402	402
Non-Labor	4-YR Average	2,984	2,984	2,984	118	118	118	3,102	3,102	3,102
NSE	4-YR Average	0	0	0	0	0	0	0	0	0
Total		**4,113**	**4,113**	**4,113**	**-609**	**-609**	**-609**	**3,504**	**3,504**	**3,504**
FTE	4-YR Average	11.6	11.6	11.6	-8.6	-8.6	-8.6	3.0	3.0	3.0

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	-728	117	0	-611	-8.6	EAMARE20161127182414863
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 30						
2017 Total		-728	117	0	-611	-8.6	
2018	Other	-728	117	0	-611	-8.6	EAMARE20161127182450773
Explanation:	Adjustment made to account historical average + forecasted growth rate,Collectible 30						
2018 Total		-728	117	0	-611	-8.6	
2019	Other	-728	117	0	-611	-8.6	EAMARE20161127182513223
Explanation:	Adjustment made to account historical average + forecasted growth rate. Collectible 30						
2019 Total		-728	117	0	-611	-8.6	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00235.0
Category: F. NEW BUSINESS
Category-Sub: 10. Mid-Coast Trolley Extension 11A
Workpaper Group: 002350 - TRANSFORMER & METER INSTALLATIONS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	1,186	1,052	952	797	974
Non-Labor	3,624	2,638	2,964	3,596	2,392
NSE	0	0	0	0	0
Total	**4,810**	**3,690**	**3,915**	**4,392**	**3,366**
FTE	13.0	11.8	10.3	8.5	8.9
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	1,186	1,052	952	797	974
Non-Labor	3,624	2,638	2,964	3,596	2,392
NSE	0	0	0	0	0
Total	**4,810**	**3,690**	**3,915**	**4,392**	**3,366**
FTE	13.0	11.8	10.3	8.5	8.9
Vacation & Sick (Nominal $)					
Labor	172	167	152	123	162
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**172**	**167**	**152**	**123**	**162**
FTE	2.1	2.1	1.8	1.5	1.6
Escalation to 2016$					
Labor	148	86	42	13	0
Non-Labor	395	186	114	50	0
NSE	0	0	0	0	0
Total	**543**	**272**	**156**	**63**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	1,506	1,305	1,146	933	1,135
Non-Labor	4,019	2,824	3,078	3,645	2,392
NSE	0	0	0	0	0
Total	**5,525**	**4,129**	**4,223**	**4,578**	**3,527**
FTE	15.1	13.9	12.1	10.0	10.5

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00235.0
Category: F. NEW BUSINESS
Category-Sub: 10. Mid-Coast Trolley Extension 11A
Workpaper Group: 002350 - TRANSFORMER & METER INSTALLATIONS

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 002350

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00235.0
Category:	F. NEW BUSINESS
Category-Sub:	10. Mid-Coast Trolley Extension 11A
Workpaper Group:	002350 - TRANSFORMER & METER INSTALLATIONS
Workpaper Detail:	002350.001 - TRANSFORMER & METER INSTALLATIONS
In-Service Date:	Not Applicable

Description:

This project provides for the following: 1) The labor transportation and minor material cost associated with the installation of new line transformers, including the replacement of existing transformers. 2) The labor and transportation cost associated with the installation of new electric meters. 3) The labor and transportation costs associated with switching for capital jobs, excluding parallel or transmission switching. 4) All costs associated with the handling & loading of retired equipment, including PCB contaminated line equipment. 5) Salvage costs associated with the disposition of distribution line equipment that is being retired or scrapped, including PCB contaminated line equipment. 6) Costs associated with the removal of transformers ultimately scrapped or sold and subsequently transferred from Accounts 583.3 (Remove Overhead Transformers) and 584.2 (Remove Underground Transformers) to Capital Account 108.4

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	402	402	402
Non-Labor	3,072	3,072	3,072
NSE	0	0	0
Total	**3,474**	**3,474**	**3,474**
FTE	3.0	3.0	3.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00235.0
Category:	F. NEW BUSINESS
Category-Sub:	10. Mid-Coast Trolley Extension 11A
Workpaper Group:	002350 - TRANSFORMER & METER INSTALLATIONS
Workpaper Detail:	002350.002 - TRANSFORMER & METER INSTALLATION - COLLECTIBLE
In-Service Date:	Not Applicable

Description:

This project provides for the following: 1) The labor transportation and minor material cost associated with the installation of new line transformers, including the replacement of existing transformers. 2) The labor and transportation cost associated with the installation of new electric meters. 3) The labor and transportation costs associated with switching for capital jobs, excluding parallel or transmission switching. 4) All costs associated with the handling & loading of retired equipment, including PCB contaminated line equipment. 5) Salvage costs associated with the disposition of distribution line equipment that is being retired or scrapped, including PCB contaminated line equipment. 6) Costs associated with the removal of transformers ultimately scrapped or sold and subsequently transferred from Accounts 583.3 (Remove Overhead Transformers) and 584.2 (Remove Underground Transformers) to Capital Account 108.4

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	0
Non-Labor	30	30	30
NSE	0	0	0
Total	**30**	**30**	**30**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
15258A - Mid-Coast Trolley Extension

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15258.0
Category: F. NEW BUSINESS
Category-Sub: 11. Mid-Coast Trolley Extension
Workpaper Group: 15258A - Mid-Coast Trolley Extension

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	998	9	0
Non-Labor	Zero-Based	0	0	0	0	0	5,920	57	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**6,918**	**66**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	10.5	0.2	0.0

Business Purpose:

SANDAG will extend the light and heavy rails from Santa Fe Station in Downtown San Diego to the University Town Center (UTC) area. Targeted ISD for passengers on trains is 2021.

Physical Description:

Multiple SDGE facilities are required to be relocated in order to accommodate the extension of the railroad. Said facilities include electric transmission, electric distribution, and high and medium pressure distribution gas infrastructure.

Project Justification:

Relocations of gas and electric facilities will be necessary from downtown San Diego northward along the I-5 to the UTC area in order to accommodate the extension of the railroad.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 15258A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.001 - Mid-Coast Trolley Extension 11A
In-Service Date:	01/31/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	10	0	0
Non-Labor	57	0	0
NSE	0	0	0
Total	**67**	**0**	**0**
FTE	0.1	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.002 - Mid-Coast Trolley Extension 11B Helo Pole/Shoo-fly
In-Service Date:	02/28/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	43	0	0
Non-Labor	258	0	0
NSE	0	0	0
Total	**301**	**0**	**0**
FTE	0.4	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.003 - Mid-Coast Trolley Extension 1A 4 & 5 - Collectible
In-Service Date:	03/31/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	9	0	0
Non-Labor	51	0	0
NSE	0	0	0
Total	**60**	**0**	**0**
FTE	0.1	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15258.0
Category: F. NEW BUSINESS
Category-Sub: 11. Mid-Coast Trolley Extension
Workpaper Group: 15258A - Mid-Coast Trolley Extension
Workpaper Detail: 15258A.004 - Mid-Coast Trolley Extension 11B

In-Service Date: 03/31/2017
Description:

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	2	0	0
Non-Labor	10	0	0
NSE	0	0	0
Total	**12**	**0**	**0**
FTE	0.1	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.005 - Mid-Coast Trolley Extension 20 (UG Relo)
In-Service Date:	04/30/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	90	0	0
Non-Labor	532	0	0
NSE	0	0	0
Total	**622**	**0**	**0**
FTE	0.9	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15258.0
Category: F. NEW BUSINESS
Category-Sub: 11. Mid-Coast Trolley Extension
Workpaper Group: 15258A - Mid-Coast Trolley Extension
Workpaper Detail: 15258A.006 - Mid-Coast Trolley Extension 11B (UG)

In-Service Date: 04/30/2017
Description:

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	627	0	0
Non-Labor	3,726	0	0
NSE	0	0	0
Total	**4,353**	**0**	**0**
FTE	6.3	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.007 - Mid-Coast Trolley Extension 14 & 15 (OH)
In-Service Date:	05/31/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	4	0	0
Non-Labor	18	0	0
NSE	0	0	0
Total	**22**	**0**	**0**
FTE	0.1	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.008 - Mid-Coast Trolley Extension 14 & 15 (OH) Collectible
In-Service Date:	05/31/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	6	0	0
Non-Labor	37	0	0
NSE	0	0	0
Total	**43**	**0**	**0**
FTE	0.1	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15258.0
Category: F. NEW BUSINESS
Category-Sub: 11. Mid-Coast Trolley Extension
Workpaper Group: 15258A - Mid-Coast Trolley Extension
Workpaper Detail: 15258A.009 - Mid-Coast Trolley Extension 14 & 15 (UG)

In-Service Date: 05/31/2017
Description:

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	58	0	0
Non-Labor	342	0	0
NSE	0	0	0
Total	**400**	**0**	**0**
FTE	0.6	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.010 - Mid-Coast Trolley Extension 14 & 15 (UG) Collectible
In-Service Date:	05/31/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	58	0	0
Non-Labor	342	0	0
NSE	0	0	0
Total	**400**	**0**	**0**
FTE	0.6	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.011 - Mid-Coast Trolley Extension 6A
In-Service Date:	08/31/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	3	0	0
Non-Labor	21	0	0
NSE	0	0	0
Total	**24**	**0**	**0**
FTE	0.1	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15258.0
Category: F. NEW BUSINESS
Category-Sub: 11. Mid-Coast Trolley Extension
Workpaper Group: 15258A - Mid-Coast Trolley Extension
Workpaper Detail: 15258A.012 - Mid-Coast Trolley Extension 6A Collectible

In-Service Date: 08/31/2017
Description:

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	3	0	0
Non-Labor	21	0	0
NSE	0	0	0
Total	**24**	**0**	**0**
FTE	0.1	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.013 - Mid-Coast Trolley Extension 11C
In-Service Date:	09/30/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	17	0	0
Non-Labor	101	0	0
NSE	0	0	0
Total	**118**	**0**	**0**
FTE	0.2	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.014 - Mid-Coast Trolley Extension 12
In-Service Date:	12/31/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	34	0	0
Non-Labor	202	0	0
NSE	0	0	0
Total	**236**	**0**	**0**
FTE	0.3	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.015 - Mid-Coast Trolley Extension 7 & 9 (OH)
In-Service Date:	12/31/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	15	0	0
Non-Labor	91	0	0
NSE	0	0	0
Total	**106**	**0**	**0**
FTE	0.2	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.016 - Mid-Coast Trolley Extension 7 & 9 (OH) Collectible
In-Service Date:	12/31/2017
Description:	

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1	0	0
Non-Labor	3	0	0
NSE	0	0	0
Total	**4**	**0**	**0**
FTE	0.1	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15258.0
Category: F. NEW BUSINESS
Category-Sub: 11. Mid-Coast Trolley Extension
Workpaper Group: 15258A - Mid-Coast Trolley Extension
Workpaper Detail: 15258A.017 - Mid-Coast Trolley 7 & 9 (UG)

In-Service Date: 01/31/2018
Description:

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	6	3	0
Non-Labor	36	18	0
NSE	0	0	0
Total	**42**	**21**	**0**
FTE	0.1	0.1	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15258.0
Category: F. NEW BUSINESS
Category-Sub: 11. Mid-Coast Trolley Extension
Workpaper Group: 15258A - Mid-Coast Trolley Extension
Workpaper Detail: 15258A.018 - Mid-Coast Trolley Extension 7 & 9 (UG) Collectible

In-Service Date: 01/31/2018
Description:

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	12	6	0
Non-Labor	72	36	0
NSE	0	0	0
Total	**84**	**42**	**0**
FTE	0.1	0.1	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15258.0
Category:	F. NEW BUSINESS
Category-Sub:	11. Mid-Coast Trolley Extension
Workpaper Group:	15258A - Mid-Coast Trolley Extension
Workpaper Detail:	15258A.019 - Mid-Coast Trolley Extension 2 perm
In-Service Date:	03/31/2018
Description:	

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

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: G. OVERHEAD POOLS
Workpaper: VARIOUS

Summary for Category: G. OVERHEAD POOLS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	43,358	57,743	81,787	110,602
Non-Labor	20,509	27,360	38,599	51,889
NSE	0	0	0	0
Total	**63,867**	**85,103**	**120,386**	**162,491**
FTE	474.1	617.9	858.4	1,146.5
009010 Local Engineering Pool - ED Pool				
Labor	33,399	41,204	55,040	66,169
Non-Labor	15,874	19,584	26,160	31,449
NSE	0	0	0	0
Total	**49,273**	**60,788**	**81,200**	**97,618**
FTE	376.2	454.3	592.6	703.9
009040 Local Engineering Pool - Substation Pool				
Labor	7,500	9,651	17,938	33,453
Non-Labor	3,339	4,297	7,986	14,893
NSE	0	0	0	0
Total	**10,839**	**13,948**	**25,924**	**48,346**
FTE	71.1	92.6	175.5	330.6
009050 Department Overhead Pool				
Labor	2,459	2,944	3,844	4,687
Non-Labor	1,296	1,551	2,026	2,470
NSE	0	0	0	0
Total	**3,755**	**4,495**	**5,870**	**7,157**
FTE	26.8	31.6	40.7	49.1
00906A CONTRACT ADMINISTRATION POOL				
Labor	0	3,944	4,965	6,293
Non-Labor	0	1,928	2,427	3,077
NSE	0	0	0	0
Total	**0**	**5,872**	**7,392**	**9,370**
FTE	0.0	39.4	49.6	62.9

Note: Totals may include rounding differences.

Beginning of Workpaper Group
009010 - Local Engineering Pool - ED Pool

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00901.0
Category: G. OVERHEAD POOLS
Category-Sub: 1. Local Engineering Pool - ED Pool
Workpaper Group: 009010 - Local Engineering Pool - ED Pool

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	37,344	37,791	34,995	42,442	33,399	41,204	55,040	66,169
Non-Labor	Base YR Rec	14,814	19,118	17,050	19,948	15,874	19,584	26,160	31,449
NSE	Base YR Rec	0	0	0	0	0	0	0	0
Total		**52,159**	**56,909**	**52,046**	**62,390**	**49,273**	**60,788**	**81,200**	**97,618**
FTE	Base YR Rec	424.4	435.2	404.5	470.9	376.2	454.3	592.6	703.9

Business Purpose:

The Local Engineering - ED Pool consists of the pool of Planners, Designers and Engineers, and support personnel who research, analyze, and design the facilities needed to serve customers. These persons address the engineering needs for new services, facilities relocations, overhead-to-underground conversions, capacity, and reliability projects. These persons also address the interaction with internal and external customers in preparing a work order package for construction. This pool includes the costs that will be allocated to electric distribution capital activities.

Physical Description:

Typical activities included in this account are:
• Communicating with internal and external customers to collect information necessary to prepare a work order package for construction;
• Performing load and sizing studies to determine the design characteristics to apply to a construction project;
• Developing a design for the construction project that meets the customer needs for service and the overall system design requirements. This design identifies the material, labor and equipment requirements necessary to complete the construction project;
• Coordination of the permitting and rights of way requirements;
• Preparing cost estimates according to the line extension rules and presenting these estimates to the internal or external customer for their approval;
• Preparing contracts and processing fees for new business construction projects; and
• Preparing work order packages and transmitting them to the internal and external groups.

Project Justification:

Local Engineering activities are required to see a project from inception to completion. Due to the volume of capital work that takes place on the distribution system, the most effective and efficient way to allocate the planning and engineering activities is through the use of the overhead pools. It is not feasible to charge directly for each electric distribution job due to the tremendous amount of work orders.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00901.0
Category:	G. OVERHEAD POOLS
Category-Sub:	1. Local Engineering Pool - ED Pool
Workpaper Group:	009010 - Local Engineering Pool - ED Pool

Forecast Methodology:

Labor - Base YR Rec

The forecast for this pool is derived from the Base Year expenditures.

Non-Labor - Base YR Rec

The forecast for this pool is derived from the Base Year expenditures.

NSE - Base YR Rec

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00901.0
Category: G. OVERHEAD POOLS
Category-Sub: 1. Local Engineering Pool - ED Pool
Workpaper Group: 009010 - Local Engineering Pool - ED Pool

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	33,398	33,398	33,398	7,806	21,642	32,771	41,204	55,040	66,169
Non-Labor	Base YR Rec	15,874	15,874	15,874	3,710	10,286	15,575	19,584	26,160	31,449
NSE	Base YR Rec	0	0	0	0	0	0	0	0	0
Total		**49,272**	**49,272**	**49,272**	**11,516**	**31,928**	**48,346**	**60,788**	**81,200**	**97,618**
FTE	Base YR Rec	376.2	376.2	376.2	78.1	216.4	327.7	454.3	592.6	703.9

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	7,805	3,710	0	11,515	78.1	EAMARE20170224160236197
Explanation:	Net upward adjustment made based on a historical relationship						
2017 Total		7,805	3,710	0	11,515	78.1	
2018	Other	21,641	10,286	0	31,927	216.4	EAMARE20170224160940547
Explanation:	Net upward adjustment made based on a historical relationship of Pool						
2018 Total		21,641	10,286	0	31,927	216.4	
2019	Other	32,770	15,575	0	48,345	327.7	EAMARE20170224161051050
Explanation:	Net upward adjustment made based on a historical relationship of Pool						
2019 Total		32,770	15,575	0	48,345	327.7	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00901.0
Category: G. OVERHEAD POOLS
Category-Sub: 1. Local Engineering Pool - ED Pool
Workpaper Group: 009010 - Local Engineering Pool - ED Pool

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	29,412	30,471	29,059	5,832	0
Non-Labor	13,358	17,860	16,420	5,651	0
NSE	0	0	0	0	0
Total	**42,770**	**48,331**	**45,479**	**11,483**	**0**
FTE	365.4	370.3	343.0	67.9	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	30,430	28,646
Non-Labor	0	0	0	14,024	15,874
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**44,453**	**44,520**
FTE	0.0	0.0	0.0	332.9	318.4
Recorded-Adjusted (Nominal $)					
Labor	29,412	30,471	29,059	36,262	28,646
Non-Labor	13,358	17,860	16,420	19,675	15,874
NSE	0	0	0	0	0
Total	**42,770**	**48,331**	**45,479**	**55,936**	**44,520**
FTE	365.4	370.3	343.0	400.8	318.4
Vacation & Sick (Nominal $)					
Labor	4,262	4,833	4,641	5,599	4,752
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**4,262**	**4,833**	**4,641**	**5,599**	**4,752**
FTE	59.0	64.9	61.5	70.1	57.8
Escalation to 2016$					
Labor	3,671	2,487	1,295	581	0
Non-Labor	1,456	1,258	631	273	0
NSE	0	0	0	0	0
Total	**5,127**	**3,745**	**1,926**	**855**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	37,344	37,791	34,995	42,442	33,399
Non-Labor	14,814	19,118	17,050	19,948	15,874
NSE	0	0	0	0	0
Total	**52,159**	**56,909**	**52,046**	**62,390**	**49,273**
FTE	424.4	435.2	404.5	470.9	376.2

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00901.0
Category: G. OVERHEAD POOLS
Category-Sub: 1. Local Engineering Pool - ED Pool
Workpaper Group: 009010 - Local Engineering Pool - ED Pool

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	0	0	0	30,430	28,646
Non-Labor	0	0	0	14,024	15,874
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**44,453**	**44,520**
FTE	0.0	0.0	0.0	332.9	318.4

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	30,430	14,024	0	44,453	332.9	EAMARE20161120140648057
Explanation:	IOs # 7074306 7074264 7074267 7074268 7074313 7074314, 7074315, 7074317, 7074318, 7074320, 7074321, 7074326, 7074347, Missing in GRID						
2015 Total		30,430	14,024	0	44,453	332.9	
2016	Other	28,646	15,874	0	44,520	318.4	EAMARE20161120154437113
Explanation:	Adjustment to include new IO 7074264 7074267 7074267 7074268 7074306 7074313 7074314 7074315 7074317 7074318 7074320 7074321 7074322 7074323 7074326						
2016 Total		28,646	15,874	0	44,520	318.4	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 009010

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00901.0
Category:	G. OVERHEAD POOLS
Category-Sub:	1. Local Engineering Pool - ED Pool
Workpaper Group:	009010 - Local Engineering Pool - ED Pool
Workpaper Detail:	009010.001 - LOCAL ENGINEERING POOL - ED POOL
In-Service Date:	Not Applicable

Description:

Typical activities included in this account are: Communicating with internal and external customers to collect information necessary to prepare a work order package for construction;
• Performing load and sizing studies to determine the design characteristics to apply to a construction project;
• Developing a design for the construction project that meets the customer needs for service and the overall system design requirements. This design identifies the material, labor and equipment requirements necessary to complete the construction project;
• Coordination of the permitting and rights of way requirements;
• Preparing cost estimates according to the line extension rules and presenting these estimates to the internal or external customer for their approval;
• Preparing contracts and processing fees for new business construction projects; and
• Preparing work order packages and transmitting them to the internal and external groups.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	40,404	54,240	65,369
Non-Labor	19,584	26,160	31,449
NSE	0	0	0
Total	**59,988**	**80,400**	**96,818**
FTE	446.3	584.6	695.9

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00901.0
Category: G. OVERHEAD POOLS
Category-Sub: 1. Local Engineering Pool - ED Pool
Workpaper Group: 009010 - Local Engineering Pool - ED Pool
Workpaper Detail: 009010.002 - RAMP - Base Work Standards & Methods

In-Service Date: Not Applicable

Description:

Local engineering Pool for Work Standards and Method portion

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	800	800	800
Non-Labor	0	0	0
NSE	0	0	0
Total	**800**	**800**	**800**
FTE	8.0	8.0	8.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00901.0
Category:	G. OVERHEAD POOLS
Category-Sub:	1. Local Engineering Pool - ED Pool
Workpaper Group:	009010 - Local Engineering Pool - ED Pool
Workpaper Detail:	009010.002 - RAMP - Base Work Standards & Methods

RAMP Item # 1

RAMP Chapter: SDG&E-3

Program Name: Works Standards and Methods

Program Description: Safety coordination

Risk/Mitigation:

Risk: SDGE-3

Mitigation: Works Standards and Methods

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	800	800	800
High	960	960	960

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 800

Explanation: Work Standards and Methods Portion of the Local Engineering Pool

Supplemental Workpapers for Workpaper Group 009010

009010 – Local Engineering Pool ED Pool

Forecast Development

The forecast for Local Engineering - Substation pool is derived from the Base year expenditures with a net upward adjustment based on the increase of Substation related capital expenditures in terms of percentages. The pool tracks the historical relationship between the engineering support requirement and the related capital driven projects.

Step 1a: Developing the Basis of Forecast

Category	2016	2017	2018	2019
CAPACITY/EXPANSION	29,097	7,487	4,151	4,151
DER INTEGRATION		732	12,674	8,016
FRANCHISE	20,662	34,463	40,180	35,190
MANDATED	35,254	30,908	30,908	30,908
MATERIALS	15,739	20,715	21,209	21,720
NEW BUSINESS	40,982	48,399	57,120	60,592
RELIABILITY/IMPROVEMENTS	38,671	42,514	63,747	57,539
SAFETY AND RISK MANAGEMENT		12,008	23,260	98,566
TRANSMISSION DRIVEN PROJECTS	2,544	28,478	48,245	45,771
Grand Total	**182,949**	**225,704**	**301,494**	**362,453**
% increase/decrease on a yearly basis		23.37%	33.58%	20.22%

Step 1b: Identifying Which Budget Codes Are Excluded from the Basis of Forecast

Category	2016	2017	2018	2019
CAPACITY/EXPANSION	7,626	16,724	6,851	21,025
DER INTEGRATION	3,255	2,566	5,669	10,000
EQUIP/TOOLS/MISC	1,376	4,833	2,531	3,029
FRANCHISE	118			
MANDATED	(379)	2,142	3,350	1,635
MATERIALS	(2,973)	4,156	5,106	5,974
NEW BUSINESS	3,148	6,918	66	-
RELIABILITY/IMPROVEMENTS	19,314	21,934	47,847	45,869
SAFETY AND RISK MANAGEMENT	49,812	71,739	90,237	85,767
TRANSMISSION DRIVEN PROJECTS	2,059	3,386	5,867	4,347
Grand Total	**83,356**	**134,398**	**167,524**	**177,646**

Step 2: Calculating the Yearly Forecast

	2016	2017	2018	2019
901 - Local Engineering Pool - ED pool	49,273	60,788	81,200	97,618
Grand Total	**49,273**	**60,788**	**81,200**	**97,618**

Beginning of Workpaper Group
009040 - Local Engineering Pool - Substation Pool

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00904.0
Category: G. OVERHEAD POOLS
Category-Sub: 2. Local Engineering Pool - Substation Pool
Workpaper Group: 009040 - Local Engineering Pool - Substation Pool

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	6,357	6,894	6,747	6,965	7,500	9,651	17,938	33,453
Non-Labor	Base YR Rec	1,443	2,641	2,126	2,866	3,339	4,297	7,986	14,893
NSE	Base YR Rec	0	0	0	0	0	0	0	0
Total		**7,800**	**9,535**	**8,872**	**9,831**	**10,840**	**13,948**	**25,924**	**48,346**
FTE	Base YR Rec	61.2	65.9	63.7	66.4	71.1	92.6	175.5	330.6

Business Purpose:

The Local Engineering – Substation Pool consists of the pool of planners, designers and engineers and support personnel who research, analyze, and design the facilities needed to serve customers. These persons address the engineering needs for substation projects. These persons also address the interaction with internal and external customers in preparing a work order package for construction. This pool includes the costs that will be allocated to electric distribution and transmission substation capital activities.

Physical Description:

Typical activities included in this account are:
• Communicating with internal and external customers to collect information necessary to prepare a work order package for construction;
• Performing load and sizing studies to determine the design characteristics to apply to a construction project;
• Developing a design for the construction project that meets the customer needs for service and the overall system design requirements. This design identifies the material, labor and equipment requirements necessary to complete the construction project;
• Coordination of the permitting and rights of way requirements;
• Preparing cost estimates according to the line extension rules and presenting these estimates to the internal or external customer for their approval;
• Preparing contracts and processing fees for new business construction projects; and
• Preparing work order packages and transmitting them to the internal and external groups.

Project Justification:

Local Engineering activities are required to see a project from inception to completion. Due to the volume of capital work that takes place on the distribution system, the most effective and efficient way to allocate the planning and engineering activities is through the use of the overhead pools. It is not feasible to charge directly for each electric distribution/substation job due to the tremendous volume of work orders. In the case of the Local Engineering – Substation Pool, it is only the substation related activities that are charged to it

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00904.0
Category:	G. OVERHEAD POOLS
Category-Sub:	2. Local Engineering Pool - Substation Pool
Workpaper Group:	009040 - Local Engineering Pool - Substation Pool

Forecast Methodology:

Labor - Base YR Rec

The forecast for this pool is derived from the Base Year expenditures

Non-Labor - Base YR Rec

The forecast for this pool is derived from the Base Year expenditures

NSE - Base YR Rec

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00904.0
Category: G. OVERHEAD POOLS
Category-Sub: 2. Local Engineering Pool - Substation Pool
Workpaper Group: 009040 - Local Engineering Pool - Substation Pool

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	7,500	7,500	7,500	2,151	10,438	25,953	9,651	17,938	33,453
Non-Labor	Base YR Rec	3,339	3,339	3,339	958	4,647	11,554	4,297	7,986	14,893
NSE	Base YR Rec	0	0	0	0	0	0	0	0	0
Total		**10,839**	**10,839**	**10,839**	**3,109**	**15,085**	**37,507**	**13,948**	**25,924**	**48,346**
FTE	Base YR Rec	71.1	71.1	71.1	21.5	104.4	259.5	92.6	175.5	330.6

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	2,151	958	0	3,109	21.5	EAMARE20170224164334980
Explanation:	Net upward adjustment made based on a historical relationship of OH						
2017 Total		2,151	958	0	3,109	21.5	
2018	Other	10,438	4,647	0	15,085	104.4	EAMARE20170224164632713
Explanation:	Net upward adjustment made based on a historical relationship of OH						
2018 Total		10,438	4,647	0	15,085	104.4	
2019	Other	25,953	11,554	0	37,507	259.5	EAMARE20170224164728887
Explanation:	Net upward adjustment made based on a historical relationship of OH						
2019 Total		25,953	11,554	0	37,507	259.5	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00904.0
Category: G. OVERHEAD POOLS
Category-Sub: 2. Local Engineering Pool - Substation Pool
Workpaper Group: 009040 - Local Engineering Pool - Substation Pool

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	5,007	5,559	5,602	1,227	0
Non-Labor	1,301	2,467	2,047	403	0
NSE	0	0	0	0	0
Total	**6,308**	**8,026**	**7,649**	**1,630**	**0**
FTE	52.7	56.1	54.0	11.1	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	4,723	6,433
Non-Labor	0	0	0	2,424	3,339
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**7,147**	**9,772**
FTE	0.0	0.0	0.0	45.4	60.2
Recorded-Adjusted (Nominal $)					
Labor	5,007	5,559	5,602	5,951	6,433
Non-Labor	1,301	2,467	2,047	2,827	3,339
NSE	0	0	0	0	0
Total	**6,308**	**8,026**	**7,649**	**8,778**	**9,772**
FTE	52.7	56.1	54.0	56.5	60.2
Vacation & Sick (Nominal $)					
Labor	725	882	895	919	1,067
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**725**	**882**	**895**	**919**	**1,067**
FTE	8.5	9.8	9.7	9.9	10.9
Escalation to 2016$					
Labor	625	454	250	95	0
Non-Labor	142	174	79	39	0
NSE	0	0	0	0	0
Total	**767**	**627**	**328**	**135**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	6,357	6,894	6,747	6,965	7,500
Non-Labor	1,443	2,641	2,126	2,866	3,339
NSE	0	0	0	0	0
Total	**7,800**	**9,535**	**8,872**	**9,831**	**10,840**
FTE	61.2	65.9	63.7	66.4	71.1

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00904.0
Category: G. OVERHEAD POOLS
Category-Sub: 2. Local Engineering Pool - Substation Pool
Workpaper Group: 009040 - Local Engineering Pool - Substation Pool

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	0	0	0	4,723	6,433
Non-Labor	0	0	0	2,424	3,339
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**7,147**	**9,772**
FTE	0.0	0.0	0.0	45.4	60.2

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	4,723	2,424	0	7,147	45.4	EAMARE20161120140849720
Explanation:	IO 7074266 Missing in GRID						
2015 Total		4,723	2,424	0	7,147	45.4	
2016	Other	6,433	3,339	0	9,772	60.2	EAMARE20161120155151800
Explanation:	Adjustment for IO s not included in GRID 7074266						
2016 Total		6,433	3,339	0	9,772	60.2	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 009040

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00904.0
Category:	G. OVERHEAD POOLS
Category-Sub:	2. Local Engineering Pool - Substation Pool
Workpaper Group:	009040 - Sale of Property
Workpaper Detail:	009040.001 - LOCAL ENGINEERING POOL - SUBSTATION POOL
In-Service Date:	Not Applicable

Description:

Typical activities included in this account are: Communicating with internal and external customers to collect information necessary to prepare a work order package for construction;
• Performing load and sizing studies to determine the design characteristics to apply to a construction project;
• Developing a design for the construction project that meets the customer needs for service and the overall system design requirements. This design identifies the material, labor and equipment requirements necessary to complete the construction project;
• Coordination of the permitting and rights of way requirements;
• Preparing cost estimates according to the line extension rules and presenting these estimates to the internal or external customer for their approval;
• Preparing contracts and processing fees for new business construction projects; and
• Preparing work order packages and transmitting them to the internal and external groups.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	9,651	17,938	33,453
Non-Labor	4,297	7,986	14,893
NSE	0	0	0
Total	**13,948**	**25,924**	**48,346**
FTE	92.6	175.5	330.6

Note: Totals may include rounding differences.

Supplemental Workpapers for Workpaper Group 009040

009040 – Local Engineering Pool – Substation Pool

Forecast Development

The forecast for Local Engineering - Substation pool is derived from the Base year expenditures with a net upward adjustment based on the increase of Substation related capital expenditures in terms of percentages. The pool tracks the historical relationship between the engineering support requirement and the related capital driven projects.

Step 1a: Developing the Basis of Forecast

Category	2016	2017	2018	2019
CAPACITY/EXPANSION	27,990	6,162	6,515	17,214
DER INTEGRATION		732	12,674	8,016
FRANCHISE	6,232	18,139	23,856	18,866
RELIABILITY/IMPROVEMENTS	4,213	11,487	17,975	24,429
SAFETY AND RISK MANAGEMENT		12,008	23,260	98,566
TRANSMISSION DRIVEN PROJECTS		932	7,645	4,345
Grand Total	**38,435**	**49,460**	**91,925**	**171,436**
% increase/decrease on a yearly basis		28.68%	85.86%	86.50%

Step 1b: Identifying Which Budget Codes Are Excluded from the Basis of Forecast

Category	2016	2017	2018	2019
CAPACITY/EXPANSION	8,733	18,049	4,487	7,962
DER INTEGRATION	3,255	2,566	5,669	10,000
EQUIP/TOOLS/MISC	1,376	4,833	2,531	3,029
FRANCHISE	14,548	16,324	16,324	16,324
MANDATED	34,875	33,050	34,258	32,543
MATERIALS	12,766	24,871	26,315	27,694
NEW BUSINESS	44,130	55,317	57,186	60,592
RELIABILITY/IMPROVEMENTS	53,772	52,961	93,619	78,979
SAFETY AND RISK MANAGEMENT	49,812	71,739	90,237	85,767
TRANSMISSION DRIVEN PROJECTS	4,603	30,932	46,467	45,773
Grand Total	**227,870**	**310,642**	**377,093**	**368,663**

Step 2: Calculating the Yearly Forecast

	2016	2017	2018	2019
904 - Local Engineering Pool - Substation	10,839	13,948	25,924	48,346
Grand Total	**10,839**	**13,948**	**25,924**	**48,346**

Beginning of Workpaper Group
009050 - Department Overhead Pool

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00905.0
Category: G. OVERHEAD POOLS
Category-Sub: 3. Department Overhead Pool
Workpaper Group: 009050 - Department Overhead Pool

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	139	101	764	2,504	2,459	2,944	3,844	4,687
Non-Labor	Base YR Rec	1,630	2,301	1,735	1,822	1,296	1,551	2,026	2,470
NSE	Base YR Rec	0	0	0	0	0	0	0	0
Total		**1,769**	**2,402**	**2,499**	**4,326**	**3,755**	**4,495**	**5,870**	**7,157**
FTE	Base YR Rec	0.3	0.5	4.1	29.1	26.8	31.6	40.7	49.1

Business Purpose:

Department Overheads are those costs for supervision and administration of crews in the SDG&E Construction and Operation (C&O) districts. Department Overhead is charged for expenses that are not attributable to one particular project, but benefit many projects, or the Construction and Operation (C&O) districts as a whole. C&O managers, construction managers, construction supervisors, dispatchers, operations assistants and other clerical C&O employees charge this account. Construction field employees charge this account when meeting on multiple projects. The non-labor piece consists of administrative expenses such as: office supplies, telephone expenses, mileage, employee uniforms and professional dues. This pool includes the costs that will be allocated to distribution gas and electric capital activities.

Physical Description:

Typical activities included in this account are:
• Management and supervision of construction personnel
• Scheduling, material ordering, dispatching for construction personnel

Project Justification:

Department Overheads are those costs for supervision and administration of crews in the SDG&E Construction and Operation (C&O) districts. Department Overhead is charged for expenses that are not attributable to one particular project, but benefit many projects, or the Construction and Operation (C&O) districts as a whole. Due to the volume of capital work that takes place on the distribution system, the most effective and efficient way to allocate the expenditures for the management of capital distribution operations activities throughout the service terriroty is through the use of this pool. It isn't feasbile to direct charge for each electric distribution job due to the tremendous volume of work orders and field memos.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00905.0
Category:	G. OVERHEAD POOLS
Category-Sub:	3. Department Overhead Pool
Workpaper Group:	009050 - Department Overhead Pool

Forecast Methodology:

Labor - Base YR Rec

This forecast is derived by taking the Base Year expenditures

Non-Labor - Base YR Rec

This forecast is derived by taking the Base Year expenditures

NSE - Base YR Rec

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00905.0
Category: G. OVERHEAD POOLS
Category-Sub: 3. Department Overhead Pool
Workpaper Group: 009050 - Department Overhead Pool

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	2,459	2,459	2,459	485	1,385	2,228	2,944	3,844	4,687
Non-Labor	Base YR Rec	1,295	1,295	1,295	256	731	1,175	1,551	2,026	2,470
NSE	Base YR Rec	0	0	0	0	0	0	0	0	0
Total		**3,754**	**3,754**	**3,754**	**741**	**2,116**	**3,403**	**4,495**	**5,870**	**7,157**
FTE	Base YR Rec	26.8	26.8	26.8	4.8	13.9	22.3	31.6	40.7	49.1

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	485	255	0	740	4.8	EAMARE20170315170407987
Explanation:	Net upward adjustment made based on a historical relationship of OH						
2017 Total		485	255	0	740	4.8	
2018	Other	1,385	730	0	2,115	13.9	EAMARE20170315170459390
Explanation:	Net upward adjustment made based on a historical relationship of OH						
2018 Total		1,385	730	0	2,115	13.9	
2019	Other	2,228	1,174	0	3,402	22.3	EAMARE20170315170553227
Explanation:	Net upward adjustment made based on a historical relationship of OH						
2019 Total		2,228	1,174	0	3,402	22.3	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00905.0
Category: G. OVERHEAD POOLS
Category-Sub: 3. Department Overhead Pool
Workpaper Group: 009050 - Department Overhead Pool

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	109	81	635	16	0
Non-Labor	1,470	2,150	1,671	1,122	0
NSE	0	0	0	0	0
Total	**1,580**	**2,231**	**2,306**	**1,137**	**0**
FTE	0.3	0.4	3.5	0.1	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	2,124	2,109
Non-Labor	0	0	0	675	1,296
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**2,799**	**3,405**
FTE	0.0	0.0	0.0	24.7	22.7
Recorded-Adjusted (Nominal $)					
Labor	109	81	635	2,140	2,109
Non-Labor	1,470	2,150	1,671	1,797	1,296
NSE	0	0	0	0	0
Total	**1,580**	**2,231**	**2,306**	**3,937**	**3,405**
FTE	0.3	0.4	3.5	24.8	22.7
Vacation & Sick (Nominal $)					
Labor	16	13	101	330	350
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**16**	**13**	**101**	**330**	**350**
FTE	0.0	0.1	0.6	4.3	4.1
Escalation to 2016$					
Labor	14	7	28	34	0
Non-Labor	160	151	64	25	0
NSE	0	0	0	0	0
Total	**174**	**158**	**92**	**59**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	139	101	764	2,504	2,459
Non-Labor	1,630	2,301	1,735	1,822	1,296
NSE	0	0	0	0	0
Total	**1,769**	**2,402**	**2,499**	**4,326**	**3,755**
FTE	0.3	0.5	4.1	29.1	26.8

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00905.0
Category: G. OVERHEAD POOLS
Category-Sub: 3. Department Overhead Pool
Workpaper Group: 009050 - Department Overhead Pool

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	0	0	0	2,124	2,109
Non-Labor	0	0	0	675	1,296
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**2,799**	**3,405**
FTE	0.0	0.0	0.0	24.7	22.7

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	2,124	675	0	2,799	24.7	EAMARE20161120141101740
Explanation:	IOs 7074319 7074322 7074323 Missing In GRID						
2015 Total		2,124	675	0	2,799	24.7	
2016	Other	2,109	1,296	0	3,405	22.7	EAMARE20161120155402427
Explanation:	Adjustment for IO s Missing in GRID 7074319 7074322 7074323						
2016 Total		2,109	1,296	0	3,405	22.7	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 009050

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00905.0
Category: G. OVERHEAD POOLS
Category-Sub: 3. Department Overhead Pool
Workpaper Group: 009050 - Department Overhead Pool
Workpaper Detail: 009050.001 - DEPARTMENT OVERHEAD POOL

In-Service Date: Not Applicable

Description:

Typical activities included in this account are: Management and supervision of construction personnel
• Scheduling, material ordering, dispatching for construction personnel

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	2,944	3,844	4,687
Non-Labor	1,551	2,026	2,470
NSE	0	0	0
Total	**4,495**	**5,870**	**7,157**
FTE	31.6	40.7	49.1

Note: Totals may include rounding differences.

Supplemental Workpapers for Workpaper Group 009050

009050 – Department Overhead Pool

Forecast Development

The forecast for Local Engineering - Substation pool is derived from the Base year expenditures with a net upward adjustment based on the increase of Substation related capital expenditures in terms of percentages. The pool tracks the historical relationship between the engineering support requirement and the related capital driven projects.

Step 1a: Developing the Basis of Forecast

Category	2016	2017	2018	2019
CAPACITY/EXPANSION	28,940	7,487	4,151	4,151
DER INTEGRATION		732	12,674	8,016
FRANCHISE	20,662	34,463	40,180	35,190
MANDATED	35,147	30,869	30,869	30,869
MATERIALS	15,739	20,715	21,209	21,720
NEW BUSINESS	40,982	48,399	57,120	60,592
RELIABILITY/IMPROVEMENTS	37,877	35,511	54,292	46,146
SAFETY AND RISK MANAGEMENT		12,008	23,260	98,566
TRANSMISSION DRIVEN PROJECTS	2,544	27,546	40,600	41,426
Grand Total	**181,891**	**217,730**	**284,355**	**346,676**
% increase/decrease on a yearly basis		19.70%	30.60%	21.92%

Step 1b: Identifying Which Budget Codes Are Excluded from the Basis of Forecast

Category	2016	2017	2018	2019
CAPACITY/EXPANSION	7,783	16,724	6,851	21,025
DER INTEGRATION	3,255	2,566	5,669	10,000
EQUIP/TOOLS/MISC	1,376	4,833	2,531	3,029
FRANCHISE	118			
MANDATED	(272)	2,181	3,389	1,674
MATERIALS	(2,973)	4,156	5,106	5,974
NEW BUSINESS	3,148	6,918	66	-
RELIABILITY/IMPROVEMENTS	20,108	28,937	57,302	57,262
SAFETY AND RISK MANAGEMENT	49,812	71,739	90,237	85,767
TRANSMISSION DRIVEN PROJECTS	2,059	4,318	13,512	8,692
Grand Total	**84,414**	**142,372**	**184,663**	**193,423**

Step 2: Calculating the Yearly Forecast

	2016	2017	2018	2019
905- Department Overhead Pool	3,755	4,495	5,870	7,157
Grand Total	**3,755**	**4,495**	**5,870**	**7,157**

Beginning of Workpaper Group
00906A - CONTRACT ADMINISTRATION POOL

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00906.0
Category: G. OVERHEAD POOLS
Category-Sub: 4. Budget Code 906 - Contract Administration Pool
Workpaper Group: 00906A - CONTRACT ADMINISTRATION POOL

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	3,944	4,965	6,293
Non-Labor	Zero-Based	0	0	0	0	0	1,928	2,427	3,077
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**5,872**	**7,392**	**9,370**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	39.4	49.6	62.9

Business Purpose:

The Contract Administration (CA) pool consists of those expenses necessary for the administration of projects that are performed by contractors for SDG&E. The expenses to this pool consist of labor for Contract Administrators and support personnel, as well as the associated non-labor support costs such as office and field supplies. This pool includes the costs that will be allocated to contracted work

Physical Description:

Typical activities included in this account are:
Working with Contractors to develop fixed price bid for construction projects;
Overseeing the Contractor work to remove obstacles and verify work is completed and complies with company standards;
Approving Contractor Invoices for completed work; and
Developing and Administering Contract Units for unit priced contracts.

Project Justification:

The CA Pool consists of those expenses necessary for the administration of projects that are performed by contractors for SDG&E. Due to the volume of capital work that takes place on the electric distribution system, the most effective and efficient way to allocate the contract administration costs is through the use of the CA Pool. It is not feasible to charge directly for each electric distribution job due to the tremendous volume of work orders.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00906.0
Category:	G. OVERHEAD POOLS
Category-Sub:	4. Budget Code 906 - Contract Administration Pool
Workpaper Group:	00906A - CONTRACT ADMINISTRATION POOL

Forecast Methodology:

Labor - Zero-Based

This forecast is derived from the Base Year Recorded expenditures with a net upward adjustment based on a historical relationship of contract administration overhead to capital expenditures. Contract Administration support tracks the historical relationship between the support requirem·ents and the related capital of Capacity/Expansion, Franchise, Mandated, New Business, Reliability/Improvements, Safety and Risk Management, and Transmission/FERC Driven Projects

Non-Labor - Zero-Based

This forecast is derived from the Base Year Recorded expenditures with a net upward adjustment based on a historical relationship of contract administration overhead to capital expenditures. Contract Administration support tracks the historical relationship between the support requirements and the related capital of Capacity/Expansion, Franchise, Mandated, New Business, Reliability/Improvements, Safety and Risk Management, and Transmission/FERC Driven Projects

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 00906A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00906.0
Category:	G. OVERHEAD POOLS
Category-Sub:	4. Budget Code 906 - Contract Administration Pool
Workpaper Group:	00906A - CONTRACT ADMINISTRATION POOL
Workpaper Detail:	00906A.001 - RAMP - Base CONTRACT ADMINISTRATION POOL
In-Service Date:	Not Applicable

Description:

Typical activities included in this account are: Working with Contractors to develop fixed price bid for construction projects;
• Overseeing the Contractor work to remove obstacles and verify work is completed and complies with company standards;
• Approving Contractor Invoices for completed work; and
• Developing and Administering Contract Units for unit priced contracts.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	3,944	4,965	6,293
Non-Labor	1,928	2,427	3,077
NSE	0	0	0
Total	**5,872**	**7,392**	**9,370**
FTE	39.4	49.6	62.9

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00906.0
Category:	G. OVERHEAD POOLS
Category-Sub:	4. Budget Code 906 - Contract Administration Pool
Workpaper Group:	00906A - CONTRACT ADMINISTRATION POOL
Workpaper Detail:	00906A.001 - RAMP - Base CONTRACT ADMINISTRATION POOL

RAMP Item # 1

RAMP Chapter: SDG&E-3

Program Name: Contract Administration Pool

Program Description: Administration of Porjects performed by Contractors

Risk/Mitigation:

Risk: Safety

Mitigation: ..

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Base Year

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 5415

Explanation: This a RAMP Item part of Employee Contracto and Public Safety

Supplemental Workpapers for Workpaper Group 00906A

009060 – Contract Administration Pool

Forecast Development

The forecast for Local Engineering - Substation pool is derived from the Base year expenditures with a net upward adjustment based on the increase of Substation related capital expenditures in terms of percentages. The pool tracks the historical relationship between the engineering support requirement and the related capital driven projects.

Step 1a: Developing the Basis of Forecast

Category	2016	2017	2018	2019
CAPACITY/EXPANSION	29,013	8,410	5,074	5,074
DER INTEGRATION		732	12,674	8,016
FRANCHISE	20,200	34,309	40,026	35,036
MANDATED	35,094	30,869	30,869	30,869
NEW BUSINESS	39,659	47,528	56,083	59,495
RELIABILITY/IMPROVEMENTS	40,664	44,083	56,362	47,715
SAFETY AND RISK MANAGEMENT		12,008	23,260	98,566
TRANSMISSION DRIVEN PROJECTS	744	1,391	1,391	1,391
Grand Total	**165,374**	**179,330**	**225,739**	**286,162**
% increase/decrease on a yearly basis		8.44%	25.88%	26.77%

Step 1b: Identifying Which Budget Codes Are Excluded from the Basis of Forecast

Category	2016	2017	2018	2019
CAPACITY/EXPANSION	7,710	15,801	5,928	20,102
DER INTEGRATION	3,255	2,566	5,669	10,000
EQUIP/TOOLS/MISC	1,376	4,833	2,531	3,029
FRANCHISE	580	154	154	154
MANDATED	(219)	2,181	3,389	1,674
MATERIALS	12,766	24,871	26,315	27,694
NEW BUSINESS	4,471	7,789	1,103	1,097
RELIABILITY/IMPROVEMENTS	17,321	20,365	55,232	55,693
SAFETY AND RISK MANAGEMENT	49,812	71,739	90,237	85,767
TRANSMISSION DRIVEN PROJECTS	3,859	30,473	52,721	48,727
Grand Total	**100,931**	**180,772**	**243,279**	**253,937**

Step 2: Calculating the Yearly Forecast

	2016	2017	2018	2019
906 - Contract Administration Pool	5,415	5,872	7,392	9,370
Grand Total	**5,415**	**5,872**	**7,392**	**9,370**

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: H. RELIABILITY/IMPROVEMENTS
Workpaper: VARIOUS

Summary for Category: H. RELIABILITY/IMPROVEMENTS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	25,150	27,532	32,692	33,914
Non-Labor	30,865	47,281	75,726	69,534
NSE	0	50	0	0
Total	**56,015**	**74,863**	**108,418**	**103,448**
FTE	160.6	203.7	255.9	268.3
002030 DISTRIBUTION SUBSTATION RELIABILITY				
Labor	467	241	241	241
Non-Labor	1,526	1,328	1,328	1,328
NSE	0	0	0	0
Total	**1,993**	**1,569**	**1,569**	**1,569**
FTE	4.3	2.3	2.3	2.3
09271A Margarita Substation - New 12kV Circuit 1259				
Labor	0	271	0	0
Non-Labor	0	451	0	0
NSE	0	0	0	0
Total	**0**	**722**	**0**	**0**
FTE	0.0	2.7	0.0	0.0
112490 INSTALL SCADA ON LINE CAPACITORS - RAMP				
Labor	33	58	1,069	1,059
Non-Labor	26	231	4,277	4,236
NSE	0	0	0	0
Total	**59**	**289**	**5,346**	**5,295**
FTE	0.3	0.6	10.7	10.6
112530 WIRELESS FAULT INDICATORS				
Labor	0	68	877	869
Non-Labor	5	272	3,509	3,476
NSE	0	0	0	0
Total	**5**	**340**	**4,386**	**4,345**
FTE	0.0	0.6	8.8	8.7
112610 SEWAGE PUMP STATION REBUILDS				
Labor	433	346	231	0
Non-Labor	1,179	1,200	100	0
NSE	0	0	0	0
Total	**1,612**	**1,546**	**331**	**0**
FTE	3.6	3.5	2.3	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: H. RELIABILITY/IMPROVEMENTS
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
112670 SCADA EXPANSION-DISTRIBUTION - RAMP				
Labor	0	0	879	879
Non-Labor	0	0	6,097	6,097
NSE	0	0	0	0
Total	**0**	**0**	**6,976**	**6,976**
FTE	0.0	0.0	8.8	8.8
122460 ADVANCED GROUND FAULT DETECTION - RAMP				
Labor	75	80	80	80
Non-Labor	152	241	241	241
NSE	0	0	0	0
Total	**227**	**321**	**321**	**321**
FTE	0.7	0.8	0.8	0.8
122490 RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE				
Labor	4	58	58	275
Non-Labor	0	150	150	713
NSE	0	0	0	0
Total	**4**	**208**	**208**	**988**
FTE	0.0	0.6	0.6	2.8
122660 CONDITION BASED MAINTENANCE-SMART GRID				
Labor	123	346	346	346
Non-Labor	293	1,200	1,200	1,200
NSE	0	0	0	0
Total	**416**	**1,546**	**1,546**	**1,546**
FTE	0.9	3.5	3.5	3.5
132420 Rebuild Kearny 69/12kV Substation				
Labor	82	1,128	600	0
Non-Labor	3,094	3,372	6,400	0
NSE	0	0	0	0
Total	**3,176**	**4,500**	**7,000**	**0**
FTE	1.0	11.3	6.0	0.0
132440 STREAMVIEW 69/12KV SUB REBUILD-PRE ENG				
Labor	0	0	0	0
Non-Labor	0	50	50	50
NSE	0	0	0	0
Total	**0**	**50**	**50**	**50**
FTE	0.0	0.0	0.0	0.0
002260 MANAGEMENT OF OH DIST. SERVICE				
Labor	2,991	3,093	3,093	3,093
Non-Labor	2,282	3,245	3,245	3,245
NSE	0	0	0	0
Total	**5,273**	**6,338**	**6,338**	**6,338**
FTE	21.7	23.6	23.6	23.6

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: H. RELIABILITY/IMPROVEMENTS
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
14143A POWAY SUBSTATION REBUILD				
Labor	0	46	0	0
Non-Labor	0	131	0	0
NSE	0	0	0	0
Total	**0**	**177**	**0**	**0**
FTE	0.0	0.5	0.0	0.0
152430 SUBSTATION SCADA EXPANSION-DISTRIBUTION				
Labor	321	167	289	0
Non-Labor	740	380	265	0
NSE	0	0	0	0
Total	**1,061**	**547**	**554**	**0**
FTE	2.6	1.7	2.9	0.0
162440 METEOROLOGY-OUTAGE PREDICTION MODELING				
Labor	0	369	0	0
Non-Labor	720	320	0	0
NSE	0	28	0	0
Total	**720**	**717**	**0**	**0**
FTE	0.0	3.7	0.0	0.0
16245A This project will modernize and operationalize fire behavior modeling. Phase two seeks				
Labor	0	0	0	0
Non-Labor	0	250	0	0
NSE	0	22	0	0
Total	**0**	**272**	**0**	**0**
FTE	0.0	0.0	0.0	0.0
162570 Vault Restoration				
Labor	0	0	204	204
Non-Labor	0	0	796	796
NSE	0	0	0	0
Total	**0**	**0**	**1,000**	**1,000**
FTE	0.0	0.0	2.0	2.0
16258A OIR Worst Circuits				
Labor	0	582	582	582
Non-Labor	0	1,920	1,920	1,920
NSE	0	0	0	0
Total	**0**	**2,502**	**2,502**	**2,502**
FTE	0.0	5.8	5.8	5.8
16260A MORRO HILL SUBSTATION REBUILD				
Labor	0	12	192	986
Non-Labor	0	0	926	2,765
NSE	0	0	0	0
Total	**0**	**12**	**1,118**	**3,751**
FTE	0.0	0.1	1.9	9.9

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: H. RELIABILITY/IMPROVEMENTS
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
172530 GRID ANALYTICS				
Labor	0	0	1,100	1,100
Non-Labor	0	0	2,200	2,200
NSE	0	0	0	0
Total	**0**	**0**	**3,300**	**3,300**
FTE	0.0	0.0	11.0	11.0
932400 DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP				
Labor	901	1,064	1,136	1,189
Non-Labor	2,883	1,736	1,854	3,760
NSE	0	0	0	0
Total	**3,784**	**2,800**	**2,990**	**4,949**
FTE	6.2	10.6	11.4	11.9
002270 MANAGEMENT OF UG DIST. SERVICE				
Labor	1,789	1,779	1,779	1,779
Non-Labor	1,405	1,714	1,714	1,714
NSE	0	0	0	0
Total	**3,194**	**3,493**	**3,493**	**3,493**
FTE	11.9	11.7	11.7	11.7
992820 REPLACE OBSOLETE SUBSTATION EQUIPMENT - RAMP				
Labor	147	263	1,973	2,423
Non-Labor	1,243	881	6,171	12,721
NSE	0	0	0	0
Total	**1,390**	**1,144**	**8,144**	**15,144**
FTE	1.1	2.1	19.8	24.2
122430 PHASOR MEASUREMENT UNITS (DISTRIBUTION)				
Labor	66	120	120	120
Non-Labor	694	1,896	1,896	1,896
NSE	0	0	0	0
Total	**760**	**2,016**	**2,016**	**2,016**
FTE	0.5	1.1	1.1	1.1
122470 SMART ISOLATION & RECLOSING				
Labor	0	298	298	298
Non-Labor	0	1,058	1,058	1,058
NSE	0	0	0	0
Total	**0**	**1,356**	**1,356**	**1,356**
FTE	0.0	2.9	2.9	2.9
132430 New Vine 69/12kV Substation				
Labor	246	594	0	0
Non-Labor	4,591	10,348	0	0
NSE	0	0	0	0
Total	**4,837**	**10,942**	**0**	**0**
FTE	2.6	5.9	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: H. RELIABILITY/IMPROVEMENTS
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
002300 REPLACEMENT OF UNDERGROUND CABLES - RAMP				
Labor	8,006	6,318	6,318	6,318
Non-Labor	9,632	5,482	19,939	9,246
NSE	0	0	0	0
Total	**17,638**	**11,800**	**26,257**	**15,564**
FTE	47.7	36.8	36.8	36.8
002360 CAPITAL RESTORATION OF SERVICE				
Labor	9,380	8,414	8,645	8,883
Non-Labor	-1,391	2,418	2,517	2,619
NSE	0	0	0	0
Total	**7,989**	**10,832**	**11,162**	**11,502**
FTE	54.7	53.2	55.5	57.9
012690 Rebuild Pt Loma Substation				
Labor	76	1,046	75	0
Non-Labor	718	5,957	426	0
NSE	0	0	0	0
Total	**794**	**7,003**	**501**	**0**
FTE	0.7	10.4	0.7	0.0
062540 EMERGENCY TRANSFORMER & SWITCHGEAR				
Labor	10	0	0	0
Non-Labor	1,073	50	1,000	50
NSE	0	0	0	0
Total	**1,083**	**50**	**1,000**	**50**
FTE	0.1	0.0	0.0	0.0
062600 REMOVE 4KV SUBS. FROM SERVICE - RAMP				
Labor	0	0	2,507	3,190
Non-Labor	0	0	6,447	8,203
NSE	0	0	0	0
Total	**0**	**0**	**8,954**	**11,393**
FTE	0.0	0.0	25.0	32.0
072450 Telegraph Canyon- 138/12kV Bank & C1226				
Labor	0	771	0	0
Non-Labor	0	1,000	0	0
NSE	0	0	0	0
Total	**0**	**1,771**	**0**	**0**
FTE	0.0	7.7	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002030 - DISTRIBUTION SUBSTATION RELIABILITY

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00203.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 1. RELIABILITY/IMPROVEMENTS CAPITAL PROJECTS
Workpaper Group: 002030 - DISTRIBUTION SUBSTATION RELIABILITY

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	302	331	331	330	467	241	241	241
Non-Labor	5-YR Average	196	1,409	382	1,225	1,526	1,328	1,328	1,328
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**498**	**1,740**	**713**	**1,555**	**1,993**	**1,569**	**1,569**	**1,569**
FTE	5-YR Average	3.0	3.4	3.4	3.4	4.3	2.3	2.3	2.3

Business Purpose:

This project is for small changes to electrical distribution substation facilities. General project categories include:
1. Safety related improvements
2. Replacement of failed/obsolete equipment
3. Capital additions under $500,000

Work authorized within this project is classified under the following accounts:
361 Structures & Improvements (Distribution)
362 Station Equipment (Distribution)
397 Communication Equipment (Distribution)

Physical Description:

This budget is required to maintain the reliability and integrity of distribution substations. The specific work required to meet safety requirements, replace, obsolete or failed equipment and make necessary small capital additions is based on requests from Engineering, Planning, Operations, and Maintenance groups.

Project Justification:

There are no alternatives to this budget if safety requirements are to be met, obsolete/failed equipment replacement is to continue, and necessary small capital additions are to be made.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00203.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	1. RELIABILITY/IMPROVEMENTS CAPITAL PROJECTS
Workpaper Group:	002030 - DISTRIBUTION SUBSTATION RELIABILITY

Forecast Methodology:

Labor - 5-YR Average

This forecast is based on historical activities as well as specific detailed cost estimates for forecasted work. This budget covers primarily reactive activities, with some smaller proactive s as required. Failures are hard to predict, so the proactive work is balanced with the reactive, depending on the number of failures within a given year.

Non-Labor - 5-YR Average

This forecast is based on historical activities as well as specific detailed cost estimates for forecasted work. This budget covers primarily reactive activities, with some smaller proactive s as required. Failures are hard to predict, so the proactive work is balanced with the reactive, depending on the number of failures within a given year.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00203.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 1. RELIABILITY/IMPROVEMENTS CAPITAL PROJECTS
Workpaper Group: 002030 - DISTRIBUTION SUBSTATION RELIABILITY

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	352	352	352	-111	-111	-111	241	241	241
Non-Labor	5-YR Average	947	947	947	381	381	381	1,328	1,328	1,328
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**1,299**	**1,299**	**1,299**	**270**	**270**	**270**	**1,569**	**1,569**	**1,569**
FTE	5-YR Average	3.5	3.5	3.5	-1.2	-1.2	-1.2	2.3	2.3	2.3

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	-111	380	0	269	-1.2	LPINEDA20161130160616060
Explanation:	Adjusted for specific detailed cost estimates for forecasted work.						
2017 Total		-111	380	0	269	-1.2	
2018	Other	-111	380	0	269	-1.2	LPINEDA20161130160942493
Explanation:	Adjusted for specific detailed cost estimates for forecasted work.						
2018 Total		-111	380	0	269	-1.2	
2019	Other	-111	380	0	269	-1.2	LPINEDA20161130161012067
Explanation:	Adjusted for specific detailed cost estimates for forecasted work.						
2019 Total		-111	380	0	269	-1.2	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00203.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 1. RELIABILITY/IMPROVEMENTS CAPITAL PROJECTS
Workpaper Group: 002030 - DISTRIBUTION SUBSTATION RELIABILITY

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	238	267	275	282	401
Non-Labor	177	1,316	368	1,208	1,526
NSE	0	0	0	0	0
Total	**415**	**1,583**	**643**	**1,490**	**1,927**
FTE	2.6	2.9	2.9	2.9	3.6
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	238	267	275	282	401
Non-Labor	177	1,316	368	1,208	1,526
NSE	0	0	0	0	0
Total	**415**	**1,583**	**643**	**1,490**	**1,927**
FTE	2.6	2.9	2.9	2.9	3.6
Vacation & Sick (Nominal $)					
Labor	34	42	44	43	66
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**34**	**42**	**44**	**43**	**66**
FTE	0.4	0.5	0.5	0.5	0.7
Escalation to 2016$					
Labor	30	22	12	5	0
Non-Labor	19	93	14	17	0
NSE	0	0	0	0	0
Total	**49**	**115**	**26**	**21**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	302	331	331	330	467
Non-Labor	196	1,409	382	1,225	1,526
NSE	0	0	0	0	0
Total	**498**	**1,740**	**713**	**1,555**	**1,993**
FTE	3.0	3.4	3.4	3.4	4.3

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00203.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 1. RELIABILITY/IMPROVEMENTS CAPITAL PROJECTS
Workpaper Group: 002030 - DISTRIBUTION SUBSTATION RELIABILITY

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 002030

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00203.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	1. RELIABILITY/IMPROVEMENTS CAPITAL PROJECTS
Workpaper Group:	002030 - DISTRIBUTION SUBSTATION RELIABILITY
Workpaper Detail:	002030.001 - RELIABILITY/IMPROVEMENTS CAPITAL PROJECTS
In-Service Date:	Not Applicable

Description:

This budget is required to maintain the reliability and integrity of distribution substations. The specific work required to meet safety requirements, replace, obsolete or failed equipment and make necessary small capital additions is based on requests from Engineering, Planning, Operations, and Maintenance groups.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	241	241	241
Non-Labor	1,328	1,328	1,328
NSE	0	0	0
Total	**1,569**	**1,569**	**1,569**
FTE	2.3	2.3	2.3

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002260 - MANAGEMENT OF OH DIST. SERVICE

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00226.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 2. MANAGEMENT OF OH DIST SERVICE
Workpaper Group: 002260 - MANAGEMENT OF OH DIST. SERVICE

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	3,475	3,109	2,907	2,980	2,991	3,093	3,093	3,093
Non-Labor	5-YR Average	5,563	3,757	1,998	2,626	2,282	3,245	3,245	3,245
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**9,038**	**6,866**	**4,905**	**5,605**	**5,274**	**6,338**	**6,338**	**6,338**
FTE	5-YR Average	26.8	24.7	21.9	22.9	21.7	23.6	23.6	23.6

Business Purpose:

This project is required to reinforce the electric overhead distribution system infrastructure by responsive action to system damages, deterioration and unsafe conditions outside normal restoration of service. The overall objective is to maintain continuity of safe and reliable customer service

Physical Description:

This project provides for the reconstruction of existing overhead distribution facilities as necessary to:

- Correct improper voltage conditions
- Replace overloaded overhead facilities
- Make emergency repairs not normally associated with restoration of service
- Repair or replace deteriorated or unsafe equipment not found through the 'Corrective Maintenance Program'
- Install fault indicators / fusing / switching equipment as necessary to maintain service reliability

Project Justification:

"The purpose of this project is to fund ongoing expenditures for overhead equipment repairs and upgrades necessary to maintain continuity of safe and reliable electric service to customers.
The alternatives to full funding for this project include:
- Reduction or suspension of mitigating efforts and correction of customer voltage problems (complaints)
- Operation of existing overhead facilities under overloaded conditions beyond acceptable limits that could accelerate system failures
- Delay in emergency repairs of unsafe conditions.

Above alternatives will have an adverse effect on public safety, service reliability, customer satisfaction and repair costs. Delaying responsive action could ultimately result in regulatory fines, increased number of customer complaints and higher long-term repair costs."

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00226.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	2. MANAGEMENT OF OH DIST SERVICE
Workpaper Group:	002260 - MANAGEMENT OF OH DIST. SERVICE

Forecast Methodology:

Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

Non-Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00226.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 2. MANAGEMENT OF OH DIST SERVICE
Workpaper Group: 002260 - MANAGEMENT OF OH DIST. SERVICE

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	3,092	3,092	3,092	1	1	1	3,093	3,093	3,093
Non-Labor	5-YR Average	3,245	3,245	3,245	0	0	0	3,245	3,245	3,245
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**6,337**	**6,337**	**6,337**	**1**	**1**	**1**	**6,338**	**6,338**	**6,338**
FTE	5-YR Average	23.6	23.6	23.6	0.0	0.0	0.0	23.6	23.6	23.6

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00226.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 2. MANAGEMENT OF OH DIST SERVICE
Workpaper Group: 002260 - MANAGEMENT OF OH DIST. SERVICE

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	2,737	2,507	2,414	2,546	2,566
Non-Labor	5,016	3,510	1,924	2,590	2,282
NSE	0	0	0	0	0
Total	**7,753**	**6,017**	**4,338**	**5,135**	**4,848**
FTE	23.1	21.0	18.6	19.5	18.4
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	2,737	2,507	2,414	2,546	2,566
Non-Labor	5,016	3,510	1,924	2,590	2,282
NSE	0	0	0	0	0
Total	**7,753**	**6,017**	**4,338**	**5,135**	**4,848**
FTE	23.1	21.0	18.6	19.5	18.4
Vacation & Sick (Nominal $)					
Labor	397	398	386	393	426
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**397**	**398**	**386**	**393**	**426**
FTE	3.7	3.7	3.3	3.4	3.3
Escalation to 2016$					
Labor	342	205	108	41	0
Non-Labor	547	247	74	36	0
NSE	0	0	0	0	0
Total	**888**	**452**	**181**	**77**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	3,475	3,109	2,907	2,980	2,991
Non-Labor	5,563	3,757	1,998	2,626	2,282
NSE	0	0	0	0	0
Total	**9,038**	**6,866**	**4,905**	**5,605**	**5,274**
FTE	26.8	24.7	21.9	22.9	21.7

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00226.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 2. MANAGEMENT OF OH DIST SERVICE
Workpaper Group: 002260 - MANAGEMENT OF OH DIST. SERVICE

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 002260

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00226.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	2. MANAGEMENT OF OH DIST SERVICE
Workpaper Group:	002260 - MANAGEMENT OF OH DIST. SERVICE
Workpaper Detail:	002260.001 - MANAGEMENT OF OH DIST SERVICE
In-Service Date:	Not Applicable

Description:

This project is required to reinforce the electric overhead distribution system infrastructure by responsive action to system damages, deterioration and unsafe conditions outside normal restoration of service. The overall objective is to maintain continuity of safe and reliable customer service

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	3,093	3,093	3,093
Non-Labor	3,245	3,245	3,245
NSE	0	0	0
Total	**6,338**	**6,338**	**6,338**
FTE	23.6	23.6	23.6

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002270 - MANAGEMENT OF UG DIST. SERVICE

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00227.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 3. MANAGEMENT OF UG DIS SERVIC
Workpaper Group: 002270 - MANAGEMENT OF UG DIST. SERVICE

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	2,389	1,678	1,354	1,684	1,789	1,779	1,779	1,779
Non-Labor	5-YR Average	2,042	2,353	1,523	1,246	1,405	1,714	1,714	1,714
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**4,431**	**4,031**	**2,878**	**2,930**	**3,194**	**3,493**	**3,493**	**3,493**
FTE	5-YR Average	15.6	10.8	9.0	11.4	11.9	11.7	11.7	11.7

Business Purpose:

This project is required to reinforce the electric underground distribution system infrastructure by responsive action to system damages, deterioration and unsafe conditions outside normal restoration of service. The overall objective is to maintain continuity of safe and reliable customer service.

Physical Description:

This project provides for the reconstruction of existing underground distribution facities as necessary to:

- Correct improper voltage conditions
- Replace overloaded overhead facilities
- Make emergency repairs not normally associated with restoration of service
- Repair or replace deteriorated or unsafe equipment not found through the ‘Corrective Maintenance Program’
- Install fault indicators / fusing / switching equipment as necessary to maintain service reliability

Project Justification:

The purpose of this project is to fund ongoing expenditures for underground equipment repairs and upgrades necessary to maintain continuity of safe and reliable electric service to customers.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00227.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	3. MANAGEMENT OF UG DIS SERVIC
Workpaper Group:	002270 - MANAGEMENT OF UG DIST. SERVICE

Forecast Methodology:

Labor - 5-YR Average

5 year average with 3% incremental is most indicative of current spend with this budget.

Non-Labor - 5-YR Average

5 year average with 3% incremental is most indicative of current spend with this budget.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00227.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 3. MANAGEMENT OF UG DIS SERVIC
Workpaper Group: 002270 - MANAGEMENT OF UG DIST. SERVICE

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	1,778	1,778	1,778	1	1	1	1,779	1,779	1,779
Non-Labor	5-YR Average	1,714	1,714	1,714	0	0	0	1,714	1,714	1,714
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**3,492**	**3,492**	**3,492**	**1**	**1**	**1**	**3,493**	**3,493**	**3,493**
FTE	5-YR Average	11.7	11.7	11.7	0.0	0.0	0.0	11.7	11.7	11.7

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00227.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 3. MANAGEMENT OF UG DIS SERVIC
Workpaper Group: 002270 - MANAGEMENT OF UG DIST. SERVICE

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	1,881	1,353	1,124	1,439	1,534
Non-Labor	1,842	2,198	1,467	1,229	1,405
NSE	0	0	0	0	0
Total	**3,723**	**3,551**	**2,591**	**2,668**	**2,940**
FTE	13.4	9.2	7.6	9.7	10.1
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	1,881	1,353	1,124	1,439	1,534
Non-Labor	1,842	2,198	1,467	1,229	1,405
NSE	0	0	0	0	0
Total	**3,723**	**3,551**	**2,591**	**2,668**	**2,940**
FTE	13.4	9.2	7.6	9.7	10.1
Vacation & Sick (Nominal $)					
Labor	273	215	180	222	255
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**273**	**215**	**180**	**222**	**255**
FTE	2.2	1.6	1.4	1.7	1.8
Escalation to 2016$					
Labor	235	110	50	23	0
Non-Labor	201	155	56	17	0
NSE	0	0	0	0	0
Total	**436**	**265**	**106**	**40**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	2,389	1,678	1,354	1,684	1,789
Non-Labor	2,042	2,353	1,523	1,246	1,405
NSE	0	0	0	0	0
Total	**4,431**	**4,031**	**2,878**	**2,930**	**3,194**
FTE	15.6	10.8	9.0	11.4	11.9

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00227.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 3. MANAGEMENT OF UG DIS SERVIC
Workpaper Group: 002270 - MANAGEMENT OF UG DIST. SERVICE

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 002270

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00227.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	3. MANAGEMENT OF UG DIS SERVIC
Workpaper Group:	002270 - MANAGEMENT OF UG DIST. SERVICE
Workpaper Detail:	002270.001 - MANAGEMENT OF UG DIS SERVIC
In-Service Date:	Not Applicable

Description:

This project provides for the reconstruction of existing underground distribution facities as necessary to:
- Correct improper voltage conditions
- Replace overloaded overhead facilities
- Make emergency repairs not normally associated with restoration of service
- Repair or replace deteriorated or unsafe equipment not found through the 'Corrective Maintenance Program'
- Install fault indicators / fusing / switching equipment as necessary to maintain service reliability

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1,779	1,779	1,779
Non-Labor	1,714	1,714	1,714
NSE	0	0	0
Total	**3,493**	**3,493**	**3,493**
FTE	11.7	11.7	11.7

Note: Totals may include rounding differences.

Beginning of Workpaper Group
002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00230.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 4. Cable Replacement
Workpaper Group: 002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP

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	6,272	6,464	5,463	5,387	8,006	6,318	6,318	6,318
Non-Labor	5-YR Average	7,590	3,911	2,865	4,654	9,632	5,482	19,939	9,246
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**13,862**	**10,375**	**8,328**	**10,041**	**17,638**	**11,800**	**26,257**	**15,564**
FTE	5-YR Average	35.2	38.1	31.0	32.1	47.7	36.8	36.8	36.8

Business Purpose:

The project provided funding for the proactive replacement of underground cable that was identified to have a high probability of failure based on electric reliability circuit analysis and cable failure data. It is also required to provide quality customer service and reliability to existing customers by proactively replacing failed cable in the underground cable system. There is presently approximately 85 circuit miles of unjacketed feeder cable and 1809 circuit miles of unjacketed lateral cable remaining on the SDG&E electric distribution system.

Physical Description:

The project facilitates the replacement of underground cable that was identified to have a high probability of failure based on electric reliability circuit analysis and cable failure data.

Project Justification:

By not performing this work, it may have a negative impact on PBR.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00230.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	4. Cable Replacement
Workpaper Group:	002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP

Forecast Methodology:

Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

Non-Labor - 5-YR Average

The forecast method used is a 5-year average based on historical data. This is the most appropriate methodology, because work load can vary from year to year. The 5-year average levels out the peaks and valleys in this blanket budget over a large period of time and still provides for the necessary level of funding for the work that falls within this budget.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00230.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 4. Cable Replacement
Workpaper Group: 002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP

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	6,318	6,318	6,318	0	0	0	6,318	6,318	6,318
Non-Labor	5-YR Average	5,730	5,730	5,730	-248	14,209	3,516	5,482	19,939	9,246
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**12,048**	**12,048**	**12,048**	**-248**	**14,209**	**3,516**	**11,800**	**26,257**	**15,564**
FTE	5-YR Average	36.8	36.8	36.8	0.0	0.0	0.0	36.8	36.8	36.8

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	0	-248	0	-248	0.0	EAMARE20170906093103123
Explanation:	Adjustment due to current detailed estimate and new cable lifecycle update						
2017 Total		0	-248	0	-248	0.0	
2018	Other	0	10,500	0	10,500	0.0	EAMARE20170719150424490
Explanation:	This Item is for the proposed Downtown Substation						
2018	Other	0	3,709	0	3,709	0.0	EAMARE20170906093400103
Explanation:	Adjustment due to current detailed estimate and new cable lifecycle update						
2018 Total		0	14,209	0	14,209	0.0	
2019	Other	0	100	0	100	0.0	EAMARE20170719150456250
Explanation:	This item is for the proposed Downtown Substation						
2019	Other	0	3,416	0	3,416	0.0	EAMARE20170906093440470
Explanation:	Adjustment due to current detailed estimate and new cable lifecycle update						
2019 Total		0	3,516	0	3,516	0.0	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00230.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 4. Cable Replacement
Workpaper Group: 002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	4,940	5,212	4,536	4,602	5,194
Non-Labor	6,844	3,654	2,759	4,590	6,470
NSE	0	0	0	0	0
Total	**11,784**	**8,866**	**7,296**	**9,193**	**11,664**
FTE	30.3	32.4	26.3	27.3	30.5
Adjustments (Nominal $) **					
Labor	0	0	0	0	1,673
Non-Labor	0	0	0	0	3,161
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**4,834**
FTE	0.0	0.0	0.0	0.0	9.9
Recorded-Adjusted (Nominal $)					
Labor	4,940	5,212	4,536	4,602	6,867
Non-Labor	6,844	3,654	2,759	4,590	9,632
NSE	0	0	0	0	0
Total	**11,784**	**8,866**	**7,296**	**9,193**	**16,498**
FTE	30.3	32.4	26.3	27.3	40.4
Vacation & Sick (Nominal $)					
Labor	716	827	724	711	1,139
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**716**	**827**	**724**	**711**	**1,139**
FTE	4.9	5.7	4.7	4.8	7.3
Escalation to 2016$					
Labor	617	425	202	74	0
Non-Labor	746	257	106	64	0
NSE	0	0	0	0	0
Total	**1,363**	**683**	**308**	**138**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	6,272	6,464	5,463	5,387	8,006
Non-Labor	7,590	3,911	2,865	4,654	9,632
NSE	0	0	0	0	0
Total	**13,862**	**10,375**	**8,328**	**10,041**	**17,638**
FTE	35.2	38.1	31.0	32.1	47.7

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00230.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 4. Cable Replacement
Workpaper Group: 002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	0	0	0	0	1,673
Non-Labor	0	0	0	0	3,161
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**4,834**
FTE	0.0	0.0	0.0	0.0	9.9

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	1,673	3,161	0	4,834	9.9	EAMARE20161107102115173
Explanation:	Adjustment made to reflect actual 2016 spend through the month of Oct-16 and Nov-Dec Q3 Outlook						
2016 Total		1,673	3,161	0	4,834	9.9	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 002300

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00230.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	4. Cable Replacement
Workpaper Group:	002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP
Workpaper Detail:	002300.001 - RAMP - Base - Cable Replacement
In-Service Date:	Not Applicable

Description:

The project provided funding for the proactive replacement of underground cable that was identified to have a high probability of failure based on electric reliability circuit analysis and cable failure data. It is also required to provide quality customer service and reliability to existing customers by proactively replacing failed cable in the underground cable system. There is presently approximately 85 circuit miles of unjacketed feeder cable and 1809 circuit miles of unjacketed lateral cable remaining on the SDG&E electric distribution system.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	6,318	6,318	6,318
Non-Labor	5,482	9,439	9,146
NSE	0	0	0
Total	**11,800**	**15,757**	**15,464**
FTE	36.8	36.8	36.8

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00230.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	4. Cable Replacement
Workpaper Group:	002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP
Workpaper Detail:	002300.001 - RAMP - Base - Cable Replacement

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Proactive cable replacement

Program Description: Proactively replace underground cable of known high failure rates. Example: replace unjacketed older vintage cable with new jacketed cable.

Risk/Mitigation:

Risk: na

Mitigation: na

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	21,900	21,900	21,900
High	28,470	28,470	28,470

Funding Source: CPUC-GRC

Forecast Method: Average

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 17637

Explanation: This item is all related to RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00230.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 4. Cable Replacement
Workpaper Group: 002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP
Workpaper Detail: 002300.002 - RAMP - Incremental Downtown Substation

In-Service Date: Not Applicable

Description:

Downtown Substation

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	0	10,500	100
NSE	0	0	0
Total	**0**	**10,500**	**100**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00230.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	4. Cable Replacement
Workpaper Group:	002300 - REPLACEMENT OF UNDERGROUND CABLES - RAMP
Workpaper Detail:	002300.002 - RAMP - Incremental Downtown Substation

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Downtown Substation

Program Description: Build a new substation in Downtown district

Risk/Mitigation:

Risk: Reliability and capacity

Mitigation: ..

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: Proposed Downtown Substation

Beginning of Workpaper Group
002360 - CAPITAL RESTORATION OF SERVICE

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00236.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 5. CAPITAL RESTORATION OF SERVICE
Workpaper Group: 002360 - CAPITAL RESTORATION OF SERVICE

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	4-YR Average	7,159	6,779	6,733	6,952	9,380	8,414	8,645	8,883
Non-Labor	4-YR Average	-3,464	-1,831	-1,754	-2,451	-1,391	2,418	2,517	2,619
NSE	4-YR Average	0	0	0	0	0	0	0	0
Total		**3,696**	**4,947**	**4,979**	**4,501**	**7,989**	**10,832**	**11,162**	**11,502**
FTE	4-YR Average	41.0	40.2	39.5	40.5	54.7	53.2	55.5	57.9

Business Purpose:

The purpose of this project is to fund reactionary repairs to SDG&E distribution facilities as necessary to restore electric service to customers in a timely manner and in compliance with the CPUC General Orders.

Physical Description:

This project is required to accomplish restoration of electric service due to system interruptions caused by severe inclement weather conditions, fires, equipment failures and damages caused by a third party.

Project Justification:

The purpose of this project is to fund reactionary repairs to SDG&E distribution facilities as necessary to restore electric service to customers in a timely manner and in compliance with the CPUC General Orders.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00236.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	5. CAPITAL RESTORATION OF SERVICE
Workpaper Group:	002360 - CAPITAL RESTORATION OF SERVICE

Forecast Methodology:

Labor - 4-YR Average

4 year average with 3% incremental is most indicative of current spend with this budget.

Non-Labor - 4-YR Average

4 year average with 3% incremental is most indicative of current spend with this budget.

NSE - 4-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00236.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 5. CAPITAL RESTORATION OF SERVICE
Workpaper Group: 002360 - CAPITAL RESTORATION OF SERVICE

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	4-YR Average	7,460	7,460	7,460	954	1,185	1,423	8,414	8,645	8,883
Non-Labor	4-YR Average	-1,856	-1,856	-1,856	4,274	4,373	4,475	2,418	2,517	2,619
NSE	4-YR Average	0	0	0	0	0	0	0	0	0
Total		**5,604**	**5,604**	**5,604**	**5,228**	**5,558**	**5,898**	**10,832**	**11,162**	**11,502**
FTE	4-YR Average	43.7	43.7	43.7	9.5	11.8	14.2	53.2	55.5	57.9

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	953	4,275	0	5,228	9.5	EAMARE20161205143848993
Explanation:	4 year average with 3% incremental is most indicative of curren spend with this budget						
2017 Total		953	4,275	0	5,228	9.5	
2018	Other	1,184	4,374	0	5,558	11.8	EAMARE20161205143936200
Explanation:	4 year average with 3% incremental is most indicative of current spend with this budget.						
2018 Total		1,184	4,374	0	5,558	11.8	
2019	Other	1,422	4,476	0	5,898	14.2	EAMARE20161205144004697
Explanation:	4 year average with 3% incremental is most indicative of current spend with this budget.						
2019 Total		1,422	4,476	0	5,898	14.2	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00236.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 5. CAPITAL RESTORATION OF SERVICE
Workpaper Group: 002360 - CAPITAL RESTORATION OF SERVICE

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	5,638	5,466	5,591	5,940	8,045
Non-Labor	-3,123	-1,711	-1,689	-2,418	-1,391
NSE	0	0	0	0	0
Total	**2,515**	**3,755**	**3,902**	**3,522**	**6,654**
FTE	35.3	34.2	33.5	34.5	46.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	5,638	5,466	5,591	5,940	8,045
Non-Labor	-3,123	-1,711	-1,689	-2,418	-1,391
NSE	0	0	0	0	0
Total	**2,515**	**3,755**	**3,902**	**3,522**	**6,654**
FTE	35.3	34.2	33.5	34.5	46.3
Vacation & Sick (Nominal $)					
Labor	817	867	893	917	1,335
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**817**	**867**	**893**	**917**	**1,335**
FTE	5.7	6.0	6.0	6.0	8.4
Escalation to 2016$					
Labor	704	446	249	95	0
Non-Labor	-340	-120	-65	-34	0
NSE	0	0	0	0	0
Total	**363**	**326**	**184**	**62**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	7,159	6,779	6,733	6,952	9,380
Non-Labor	-3,464	-1,831	-1,754	-2,451	-1,391
NSE	0	0	0	0	0
Total	**3,696**	**4,947**	**4,979**	**4,501**	**7,989**
FTE	41.0	40.2	39.5	40.5	54.7

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00236.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 5. CAPITAL RESTORATION OF SERVICE
Workpaper Group: 002360 - CAPITAL RESTORATION OF SERVICE

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 002360

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00236.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	5. CAPITAL RESTORATION OF SERVICE
Workpaper Group:	002360 - CAPITAL RESTORATION OF SERVICE
Workpaper Detail:	002360.001 - RAMP - Incremental CAPITAL RESTORATION OF SERVICE
In-Service Date:	Not Applicable

Description:

This project provides for the reconstruction of existing overhead and underground distribution facilities as necessary to restore electric service to customers. The funds within this budget cover al costs associated with the following factors:

- Storm Damage (rain/wind/fire for example)
- Damage to electric distribution facilities by others (car/equipment contacts for example)
- Emergency repairs of facilities that are required for service restoration (cable or equipment failures for example)

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	8,414	8,645	8,883
Non-Labor	2,418	2,517	2,619
NSE	0	0	0
Total	**10,832**	**11,162**	**11,502**
FTE	53.2	55.5	57.9

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00236.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	5. CAPITAL RESTORATION OF SERVICE
Workpaper Group:	002360 - CAPITAL RESTORATION OF SERVICE
Workpaper Detail:	002360.001 - RAMP - Incremental CAPITAL RESTORATION OF SERVICE

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: CAPITAL RESTORATION

Program Description: Capital Improvements

Risk/Mitigation:

Risk: Chapter 12

Mitigation: Post Filing

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Average

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 7990

Explanation: Post Test Year

Beginning of Workpaper Group
012690 - Rebuild Pt Loma Substation

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 01269.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 6. Rebuild Pt Loma Substation
Workpaper Group: 012690 - Rebuild Pt Loma Substation

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	28	169	99	76	1,046	75	0
Non-Labor	Zero-Based	0	430	1,222	186	718	5,957	426	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**459**	**1,391**	**285**	**794**	**7,003**	**501**	**0**
FTE	Zero-Based	0.0	0.4	1.8	1.1	0.7	10.4	0.7	0.0

Business Purpose:

The existing Pt Loma Substation is approximately 61 years old with a capacity of 60MVA.The Point Loma 69/12/4 kV Substation Rebuild Project will update the 69kV yard, rebuild the 12kV yard, and remove the 4 kV yard to eliminate aging equipment, conform to SDG&E's current substation reliability design standards, and fulfill an existing need for expanding the substation's ultimate capacity. Point Loma Substation currently ranks in the Substation Equipment Assessment (SEA) Team's upper fifth percentile of poor performing substations.
Point Loma serves several major customers, including the Airport, Sea World, Liberty Station, and Pump Station #2.The 69kV bus at Pt Loma is the only feed to Cabrillo substation and it is also the only feed to the NTCQF.
This justification has been shortened due to character limitations. Full write-up can be found on CBD
1. Safety related improvements
2. Replacement of failed/obsolete equipment
3. Capital additions under $500,000.
Work authorized within this project is classified under the following accounts:
361 Structures & improvements (Distribution)
362 Station Equipment (Distribution)
397 Communication Equipment (Distribution)

Physical Description:

The Point Loma Substation rebuild will be for an ultimate 120MVA of capacity with an initial build of replacing five aging 69kV TL breakers and 69kV PTs and rebuilding the 69kV bus. The existing 69/4kV transformer and 4kV rack will be removed. A new control shelter will be constructed where new microprocessor relaying and SCADA will be installed. The existing 12kV rack wil be removed and three 69/12kV transformers with three sections of 12kV switchgear will be installed. Two existing open rack 12kV capacitors will be replaced with new 12kV 7.2MVAR step capacitors. Due to the configuration of the property and fence, this project will not require a Permit to Construct (PTC), thus streamlining the construction process. A retaining wall will be constructed at the top of the slope inside the substation to prevent a major slidie of the hill.

Project Justification:

Point Loma Substation was originally built over 60 years ago and currently ranks in the Substation Equipment Assessment (SEA) Team's upper fifth percentile of poor performing substations with outages. The existing substation does not allow room for expansion and its current configuration does not meet today's reliability standards. A rebuild of Point Loma Substation will result in improved reliability and capacity for both Distribution and Transmission.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	01269.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	6. Rebuild Pt Loma Substation
Workpaper Group:	012690 - Rebuild Pt Loma Substation

Forecast Methodology:

Labor - Zero-Based

ZERO Based The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E utilizes comprehensive cost estimating programs to develop detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs, are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

ZERO Based The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E utilizes comprehensive cost estimating programs to develop detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs, are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 01269.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 6. Rebuild Pt Loma Substation
Workpaper Group: 012690 - Rebuild Pt Loma Substation

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	1,046	75	0	0	0	0	1,046	75	0
Non-Labor	Zero-Based	5,957	426	0	0	0	0	5,957	426	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**7,003**	**501**	**0**	**0**	**0**	**0**	**7,003**	**501**	**0**
FTE	Zero-Based	10.4	0.7	0.0	0.0	0.0	0.0	10.4	0.7	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 01269.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 6. Rebuild Pt Loma Substation
Workpaper Group: 012690 - Rebuild Pt Loma Substation

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	23	140	85	65
Non-Labor	0	402	1,177	183	718
NSE	0	0	0	0	0
Total	**0**	**425**	**1,317**	**268**	**783**
FTE	0.0	0.3	1.5	0.9	0.6
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	23	140	85	65
Non-Labor	0	402	1,177	183	718
NSE	0	0	0	0	0
Total	**0**	**425**	**1,317**	**268**	**783**
FTE	0.0	0.3	1.5	0.9	0.6
Vacation & Sick (Nominal $)					
Labor	0	4	22	13	11
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**4**	**22**	**13**	**11**
FTE	0.0	0.1	0.3	0.2	0.1
Escalation to 2016$					
Labor	0	2	6	1	0
Non-Labor	0	28	45	3	0
NSE	0	0	0	0	0
Total	**0**	**30**	**51**	**4**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	28	169	99	76
Non-Labor	0	430	1,222	186	718
NSE	0	0	0	0	0
Total	**0**	**459**	**1,391**	**285**	**794**
FTE	0.0	0.4	1.8	1.1	0.7

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 01269.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 6. Rebuild Pt Loma Substation
Workpaper Group: 012690 - Rebuild Pt Loma Substation

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 012690

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	01269.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	6. Rebuild Pt Loma Substation
Workpaper Group:	012690 - Rebuild Pt Loma Substation
Workpaper Detail:	012690.001 - Rebuild Pt Loma Substation
In-Service Date:	06/30/2018

Description:

The Point Loma Substation rebuild will be for an ultimate 120MVA of capacity with an initial build of replacing five aging 69kV TL breakers and 69kV PTs and rebuilding the 69kV bus. The existing 69/4kV transformer and 4kV rack will be removed. A new control shelter will be constructed where new microprocessor relaying and SCADA will be installed. The existing 12kV rack wil be removed and three 69/12kV transformers with three sections of 12kV switchgear will be installed. Two existing open rack 12kV capacitors will be replaced with new 12kV 7.2MVAR step capacitors. Due to the configuration of the property and fence, this project will not require a Permit to Construct (PTC), thus streamlining the construction process. A retaining wall will be constructed at the top of the slope inside the substation to prevent a major slidie of the hill.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1,046	75	0
Non-Labor	5,957	426	0
NSE	0	0	0
Total	**7,003**	**501**	**0**
FTE	10.4	0.7	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
062540 - EMERGENCY TRANSFORMER & SWITCHGEAR

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06254.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 7. Emergency Substation Equipment
Workpaper Group: 062540 - EMERGENCY TRANSFORMER & SWITCHGEAR

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	3	35	4	0	10	0	0	0
Non-Labor	Zero-Based	18	58	19	455	1,073	50	1,000	50
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**21**	**93**	**23**	**455**	**1,082**	**50**	**1,000**	**50**
FTE	Zero-Based	0.0	0.4	0.0	0.0	0.1	0.0	0.0	0.0

Business Purpose:

Support the restoration of service to our distribution customers following outages caused by equipment failure by purchasing additional emergency spare and mobile equipment. The number of aging transformers on the SDG&E system is at the level that additional failures are expected despite our efforts to replace them before failure. Lead times for replacement units continue to be extended out farther every year. This project will provide two additional 69/12kV transformers for this purpose. Our existing non-LTC mobile transformers are frequently utilized for routine maintenance and construction activites due to the high loading of our substations. This project will provide an additional 69/12kV mobile transformer with an LTC to allow the rapid restoration of service. SDG&E currently does not have any mobile 12kV regulators or a section of 12kV switchgear. This project will correct that with the purchase of both of those items. A failure inside of any existing metalclad switchgear could result in a lengthy outage. All of this mobile equipment is usually connected using portable 69kV and 12kV cables. This project also provide an cable dolly to store these cables for rapid transport to the site they are needed.

Physical Description:

Two 69/12kV transformers will be purchased, delivered and installed on a concrete pad at locations to be determined.

One trailer mounted cable dolly will be purchased and stored at Kearny.

One 12kV mobile regulator will be purchased and stored at Miramar.

One quarter section of 12kV switchgear mounted on a skid to allow it to be transported on a flat bed trailer will be purchased and store at Miramar.

Project Justification:

The purchase of this additional equipment is required to allow rapid restoration of service following an outage caused by equipment failures. It is driven by the size of the SDG&E distribution system and the age of the SDG&E distribution substation equipment in service.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06254.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	7. Emergency Substation Equipment
Workpaper Group:	062540 - EMERGENCY TRANSFORMER & SWITCHGEAR

Forecast Methodology:

Labor - Zero-Based

The forecast methodology is based on detailed cost estimates that are developed based on the specific scope of work for the project. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate.

Non-Labor - Zero-Based

The forecast methodology is based on detailed cost estimates that are developed based on the specific scope of work for the project. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06254.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 7. Emergency Substation Equipment
Workpaper Group: 062540 - EMERGENCY TRANSFORMER & SWITCHGEAR

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	50	1,000	50	0	0	0	50	1,000	50
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**50**	**1,000**	**50**	**0**	**0**	**0**	**50**	**1,000**	**50**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06254.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 7. Emergency Substation Equipment
Workpaper Group: 062540 - EMERGENCY TRANSFORMER & SWITCHGEAR

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	2	28	3	0	9
Non-Labor	16	54	18	449	1,073
NSE	0	0	0	0	0
Total	**19**	**82**	**22**	**449**	**1,081**
FTE	0.0	0.3	0.0	0.0	0.1
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	2	28	3	0	9
Non-Labor	16	54	18	449	1,073
NSE	0	0	0	0	0
Total	**19**	**82**	**22**	**449**	**1,081**
FTE	0.0	0.3	0.0	0.0	0.1
Vacation & Sick (Nominal $)					
Labor	0	4	1	0	1
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**4**	**1**	**0**	**1**
FTE	0.0	0.1	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	2	0	0	0
Non-Labor	2	4	1	6	0
NSE	0	0	0	0	0
Total	**2**	**6**	**1**	**6**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	3	35	4	0	10
Non-Labor	18	58	19	455	1,073
NSE	0	0	0	0	0
Total	**21**	**93**	**23**	**455**	**1,082**
FTE	0.0	0.4	0.0	0.0	0.1

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06254.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 7. Emergency Substation Equipment
Workpaper Group: 062540 - EMERGENCY TRANSFORMER & SWITCHGEAR

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 062540

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06254.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	7. Emergency Substation Equipment
Workpaper Group:	062540 - EMERGENCY TRANSFORMER & SWITCHGEAR
Workpaper Detail:	062540.001 - Emergency Substation Equipment
In-Service Date:	Not Applicable

Description:

Two 69/12kV transformers will be purchased delivered and installed on a concrete pad at locations to be determined.

One 69/12kV and one 12/4kV mobile transformer with an LTC will be purchased and stored at Miramar with the other mobile equipment.

One 12kV mobile regulator will be purchased and stored at Miramar.

One quarter section of 12kV switchgear mounted on a skid to allow it to be transported on a flat bed trailer will be purchased and store at Miramar.

One trailer mounted cable dolly will be purchased and stored at Kearny.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	0
Non-Labor	50	1,000	50
NSE	0	0	0
Total	**50**	**1,000**	**50**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06260.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 8. 4 kV Modernization - Distribution
Workpaper Group: 062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP

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	2,507	3,190
Non-Labor	Zero-Based	55	6	0	0	0	0	6,447	8,203
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**54**	**6**	**0**	**0**	**0**	**0**	**8,954**	**11,393**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	25.0	32.0

Business Purpose:

This blanket budget provides funding for distribution work to support the removal of 4kV substations. The 4kV system is a legacy system at SDG&E. Retaining 4kV substations would exacerbate existing safety, operation and maintenance issues. Half of the substations are over 50 years old, and replacement parts for those substations are no longer available. The operation of 4kV substations is of a major safety concern because the company is facing a shortage of qualified crews and electricians who are familiar and knowledgeable of design and operation of those aging and obsolete substations. The maintenance cost is unusually high and continues to increase. The 4kV substations are also reliability risks for the customers because high failure rates and lack of replacement parts would cause more frequent and unnecessary extended outages.

Physical Description:

This project will support construction activities on the distribution system that prepare for the removal of 4kV substations.The activities are associated with converting 4kV circuits to 12kV circuits, replacing 4kV-substation source with 12/4kVstep-downs, and removing de-energized distribution facility. Construction will include but it's not limited to changing poles,cross-arms, insulation for 12kV, replacing secondary transformers from 4kV high side to 12kV high side, installing switches, 12/4kV step-downs, and removing de-energized distribution facility.

Project Justification:

The Reliability Assessment Team has identified the condition of thirty six 4kV substations remaining in the system. Together they serve ninety 4kV circuits, 58,000 customers and 100MW of load. Twenty two substations are 40 years or older. Certain equipment inside the substations such as transformers and breakers are obsolete, and replacement parts nolonger available. Operation of the 4kV substations is a major safety issue because the majority of the work force is young and not familiar with the design and operation of the substations, and the training for those substations is no longer available. This project is required to support the removal of 4kV substations, rectify safety issues associated with the operation of those substations, and improve reliability to the customers. Revision 5 updates project cost information for the year 2012, add data for year 2016 and delete data for 2010 and prior years which is no longer necessary.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06260.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	8. 4 kV Modernization - Distribution
Workpaper Group:	062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06260.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 8. 4 kV Modernization - Distribution
Workpaper Group: 062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP

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	2,507	3,190	0	0	0	0	2,507	3,190
Non-Labor	Zero-Based	0	6,447	8,203	0	0	0	0	6,447	8,203
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**8,954**	**11,393**	**0**	**0**	**0**	**0**	**8,954**	**11,393**
FTE	Zero-Based	0.0	25.0	32.0	0.0	0.0	0.0	0.0	25.0	32.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06260.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 8. 4 kV Modernization - Distribution
Workpaper Group: 062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	0
Non-Labor	49	5	0	0	0
NSE	0	0	0	0	0
Total	**49**	**5**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	49	5	0	0	0
NSE	0	0	0	0	0
Total	**49**	**5**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	5	0	0	0	0
NSE	0	0	0	0	0
Total	**5**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	0
Non-Labor	55	6	0	0	0
NSE	0	0	0	0	0
Total	**54**	**6**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06260.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 8. 4 kV Modernization - Distribution
Workpaper Group: 062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP

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 062600

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06260.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	8. 4 kV Modernization - Distribution
Workpaper Group:	062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP
Workpaper Detail:	062600.001 - RAMP - Incremental - RAMP 4 kV Modernization - Distribution
In-Service Date:	Not Applicable

Description:

Overhead distribution modernization and hardening

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	2,006	2,552
Non-Labor	0	5,158	6,562
NSE	0	0	0
Total	**0**	**7,164**	**9,114**
FTE	0.0	20.1	25.5

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06260.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	8. 4 kV Modernization - Distribution
Workpaper Group:	062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP
Workpaper Detail:	062600.001 - RAMP - Incremental - RAMP 4 kV Modernization - Distribution

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: 4 kV Modernization - Distribution

Program Description: Overhead 4 kV infrastructure is proven to be relatively more susceptible to wire down events than 12 kV (per 100 miles of installed conductor). Consequences of these wire down events may include catastrophic fire and death or injury to the public. With steady numbers of wire down events per year in recent history, these risks continue to be steadily present. Both overhead and underground 4 kV systems are antiquated and do not enable the utility to install advanced protective and control devices, which help to improve reliability (detecting, isolating, etc.) and regulate voltage per regulatory and national standard requirements. Several types of 4 kV equipment can no longer be stocked. If these equipment were to fail in the field, customers are at risk of extended outages in order for crews to bypass equipment due to unavailability of replacement infrastructure. 4 kV is inherently less efficient than 12 kV by a factor of 9-10, causing unecessary costs to serve customers for an equivalent amount of energy on a 12 kV system.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Overhead distribution modernization and hardening

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	6,000	6,000	6,000
High	7,800	7,800	7,800

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: N/A

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: N/A no historical costs

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06260.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 8. 4 kV Modernization - Distribution
Workpaper Group: 062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP
Workpaper Detail: 062600.002 - RAMP - Incremental - 4 kV Modernization - Substation

In-Service Date: Not Applicable

Description:

Substation rebuild/replacements based on operational significance and SDG&E reliability standards

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	501	638
Non-Labor	0	1,289	1,641
NSE	0	0	0
Total	**0**	**1,790**	**2,279**
FTE	0.0	4.9	6.5

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06260.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	8. 4 kV Modernization - Distribution
Workpaper Group:	062600 - REMOVE 4KV SUBS. FROM SERVICE - RAMP
Workpaper Detail:	062600.002 - RAMP - Incremental - 4 kV Modernization - Substation

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: 4 kV Modernization - Substation

Program Description: The proposed expanded scope includes: 4 kV package or "unit" substation removal and modernize other aging substation infrastructure; cutover to 12 kV, including complete rebuilding, relay upgrades, and accommodations, design, and construction of advanced substation voltage control and/or DER where practical and applicable.

Risk/Mitigation:

Risk: na

Mitigation: Substation rebuild/replacements based on operational significance and SDG&E reliability standards

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	1,400	1,400	1,400
High	1,820	1,820	1,820

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: N/A no historical costs

Beginning of Workpaper Group
072450 - Telegraph Canyon- 138/12kV Bank & C1226

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 07245.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 9. TELEGRAPH CANYON 138/12kV BANK & C1226
Workpaper Group: 072450 - Telegraph Canyon- 138/12kV Bank & C1226

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	133	4	1	0	0	771	0	0
Non-Labor	Zero-Based	40	1	-2	0	0	1,000	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**173**	**4**	**-1**	**0**	**0**	**1,771**	**0**	**0**
FTE	Zero-Based	1.3	0.0	0.0	0.0	0.0	7.7	0.0	0.0

Business Purpose:

The purpose of this project is to mitigate heavily loaded circuit in Otay Mesa area and increase reliability for circuits feeding Salt Creek substation as well as major customers in the area.

Physical Description:

The project requires trenching and installing conduit as well as cable along with removing existing underground cable. Two new PME3 manual switches will be installed and retagging electric distribution equipment that was cut-over to the new circuit.

Project Justification:

Project mitigates a forecasted 94% heavily loaded circuit 942 that has recently received load additions from a major customer. This project is the second phase as a new transformer was installed previously and will provide further ties to circuits being cutover to Salt Creek substation.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	07245.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	9. TELEGRAPH CANYON 138/12kV BANK & C1226
Workpaper Group:	072450 - Telegraph Canyon- 138/12kV Bank & C1226

Forecast Methodology:

Labor - Zero-Based

The forecast method used for TC: 4th 138/12kV Bank and New 12kV C1226 is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for TC: 4th 138/12kV Bank and New 12kV C1226 is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 07245.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 9. TELEGRAPH CANYON 138/12kV BANK & C1226
Workpaper Group: 072450 - Telegraph Canyon- 138/12kV Bank & C1226

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	771	0	0	0	0	0	771	0	0
Non-Labor	Zero-Based	1,000	0	0	0	0	0	1,000	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**1,771**	**0**	**0**	**0**	**0**	**0**	**1,771**	**0**	**0**
FTE	Zero-Based	7.7	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 07245.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 9. TELEGRAPH CANYON 138/12kV BANK & C1226
Workpaper Group: 072450 - Telegraph Canyon- 138/12kV Bank & C1226

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	104	3	1	0	0
Non-Labor	36	0	-2	0	0
NSE	0	0	0	0	0
Total	**141**	**3**	**-1**	**0**	**0**
FTE	1.1	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	104	3	1	0	0
Non-Labor	36	0	-2	0	0
NSE	0	0	0	0	0
Total	**141**	**3**	**-1**	**0**	**0**
FTE	1.1	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	15	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**15**	**0**	**0**	**0**	**0**
FTE	0.2	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	13	0	0	0	0
Non-Labor	4	0	0	0	0
NSE	0	0	0	0	0
Total	**17**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	133	4	1	0	0
Non-Labor	40	1	-2	0	0
NSE	0	0	0	0	0
Total	**173**	**4**	**-1**	**0**	**0**
FTE	1.3	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 07245.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 9. TELEGRAPH CANYON 138/12kV BANK & C1226
Workpaper Group: 072450 - Telegraph Canyon- 138/12kV Bank & C1226

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 072450

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	07245.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	9. TELEGRAPH CANYON 138/12kV BANK & C1226
Workpaper Group:	072450 - Telegraph Canyon- 138/12kV Bank & C1226
Workpaper Detail:	072450.001 - TELEGRAPH CANYON 138/12kV BANK & C1226
In-Service Date:	08/31/2017

Description:

The project requires trenching and installing conduit as well as 1000 kcmil cable along with removing existing underground cable. Two new PME3 manual switches will be installed and retagging electric distribution equipment.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	771	0	0
Non-Labor	1,000	0	0
NSE	0	0	0
Total	**1,771**	**0**	**0**
FTE	7.7	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
09271A - Margarita Substation - New 12kV Circuit 1259

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 09271.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 10. C1259 MAR New 12kV Circuit
Workpaper Group: 09271A - Margarita Substation - New 12kV Circuit 1259

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	271	0	0
Non-Labor	Zero-Based	0	0	0	0	0	451	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**722**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0

Business Purpose:

This budget provides funding to improve reliability in the South Orange County area by transferring load from other circuits to the newly constructed circuit.

Physical Description:

Project requires trenching and installing cable along with a 4-Way Trayer SCADA switch. Retagging of electric distribution equipment is also required after load is transferred.

Project Justification:

Project provides additional capacity for new customer developments and enhances circuit reliability in the area by enhancing the tie capacity on several circuits.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	09271.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	10. C1259 MAR New 12kV Circuit
Workpaper Group:	09271A - Margarita Substation - New 12kV Circuit 1259

Forecast Methodology:

Labor - Zero-Based

The forecast method used for C1259, MAR: New 12 kV Circuit is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects. actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for C1259, MAR: New 12 kV Circuit is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects. actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 09271A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	09271.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	10. C1259 MAR New 12kV Circuit
Workpaper Group:	09271A - Margarita Substation - New 12kV Circuit 1259
Workpaper Detail:	09271A.001 - C1259 MAR New 12kV Circuit
In-Service Date:	08/31/2017

Description:

Project requires trenching and installing 1000 kcmil cable along with a 4-Way Trayer SCADA switch. Retagging of electric distribution equipment is also required.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	271	0	0
Non-Labor	451	0	0
NSE	0	0	0
Total	**722**	**0**	**0**
FTE	2.7	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
112490 - INSTALL SCADA ON LINE CAPACITORS - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11249.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 11. INSTALL SCADA ON LINE CAPACITORS
Workpaper Group: 112490 - INSTALL SCADA ON LINE CAPACITORS - RAMP

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	142	629	260	26	33	58	1,069	1,059
Non-Labor	Zero-Based	3,346	4,026	528	-983	26	231	4,277	4,236
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**3,488**	**4,655**	**788**	**-957**	**59**	**289**	**5,346**	**5,295**
FTE	Zero-Based	1.2	5.6	2.2	0.2	0.3	0.6	10.7	10.6

Business Purpose:

This budget provides funding to convert existing distribution line capacitors to SCADA control in order to provide improved VAR control, and improved system efficiency and operability.

Physical Description:

SDG&E shall convert existing distribution line capacitors to SCADA control. SCADA controls also alert utility personnel of capacitor failures and/or fuse operations. This will increase capacitor bank reliability, minimize downtime, and expedite repair work.

Project Justification:

SCADA controlled capacitor banks will provide local and remote control, failure prediction and detection, reduced operating cost, and should enhance distribution system performance through improved voltage and reactive power control. As certain elements of “Smart Grid” evolve, including less predictable Distributed Energy Resources, the ability to dynamically adjust reactive power flow will become more critical. SCADA controlled capacitors will also allow early indications of problems and potential failures of line capacitors.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11249.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	11. INSTALL SCADA ON LINE CAPACITORS
Workpaper Group:	112490 - INSTALL SCADA ON LINE CAPACITORS - RAMP

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11249.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 11. INSTALL SCADA ON LINE CAPACITORS
Workpaper Group: 112490 - INSTALL SCADA ON LINE CAPACITORS - RAMP

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	58	1,069	1,059	0	0	0	58	1,069	1,059
Non-Labor	Zero-Based	231	4,277	4,236	0	0	0	231	4,277	4,236
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**289**	**5,346**	**5,295**	**0**	**0**	**0**	**289**	**5,346**	**5,295**
FTE	Zero-Based	0.6	10.7	10.6	0.0	0.0	0.0	0.6	10.7	10.6

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11249.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 11. INSTALL SCADA ON LINE CAPACITORS
Workpaper Group: 112490 - INSTALL SCADA ON LINE CAPACITORS - RAMP

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	112	508	216	22	28
Non-Labor	3,017	3,761	508	-970	26
NSE	0	0	0	0	0
Total	**3,129**	**4,268**	**724**	**-947**	**54**
FTE	1.0	4.8	1.9	0.2	0.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	112	508	216	22	28
Non-Labor	3,017	3,761	508	-970	26
NSE	0	0	0	0	0
Total	**3,129**	**4,268**	**724**	**-947**	**54**
FTE	1.0	4.8	1.9	0.2	0.3
Vacation & Sick (Nominal $)					
Labor	16	81	34	3	5
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**16**	**81**	**34**	**3**	**5**
FTE	0.2	0.8	0.3	0.0	0.0
Escalation to 2016$					
Labor	14	41	10	0	0
Non-Labor	329	265	20	-13	0
NSE	0	0	0	0	0
Total	**343**	**306**	**29**	**-13**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	142	629	260	26	33
Non-Labor	3,346	4,026	528	-983	26
NSE	0	0	0	0	0
Total	**3,488**	**4,655**	**788**	**-957**	**59**
FTE	1.2	5.6	2.2	0.2	0.3

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11249.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 11. INSTALL SCADA ON LINE CAPACITORS
Workpaper Group: 112490 - INSTALL SCADA ON LINE CAPACITORS - RAMP

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 112490

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11249.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	11. INSTALL SCADA ON LINE CAPACITORS
Workpaper Group:	112490 - INSTALL SCADA ON LINE CAPACITORS - RAMP
Workpaper Detail:	112490.001 - Ramp - Base -INSTALL SCADA ON LINE CAPACITORS
In-Service Date:	Not Applicable

Description:

Convert the existing 1404 existing line capacitors to SCADA control.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	58	1,069	1,059
Non-Labor	231	4,277	4,236
NSE	0	0	0
Total	**289**	**5,346**	**5,295**
FTE	0.6	10.7	10.6

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11249.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	11. INSTALL SCADA ON LINE CAPACITORS
Workpaper Group:	112490 - INSTALL SCADA ON LINE CAPACITORS - RAMP
Workpaper Detail:	112490.001 - Ramp - Base -INSTALL SCADA ON LINE CAPACITORS

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: SCADA capacitor deployment

Program Description: In lieu of continued deployment of distribution shunt capacitors, with or without SCADA, the utility will face difficulties in actively regulating voltage within mandated and standardized thresholds. As a result, the company could face regulatory penalties in the form of fines and customers may be unable to use certain appliances properly, which could also cause unecessary administrative burden for utility service personnel in order to respond to customer inquiries. Severely adverse voltage conditions may cause utility equipment to misoperate, causing potential reliability issues and unnecessary outages. Without SCADA-enabled capacitors, the utility is exposed to routine risks of having service personnel dispatched into the field (e.g. added risk of vehicle incidents on the road), coupled with prolonged outage time for customers (SCADA data also provides operational insights in electrically significant or strategic segments of the distribution circuit (i.e. monitoring points), that which in lieu of could potentially and unecessarily extend troubleshooting and outage recovery time). All these risks are likely to grow as emerging technologies such as EV and PV continue to be integrated with the distribution system.

Risk/Mitigation:

Risk: SDG&E-12

Mitigation: Expand and Maintain Distribution Advanced SCADA infrastructure

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Average

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 58

Explanation: This item is all related to RAMP- Included as Advanced projetction in BC 12246

Beginning of Workpaper Group
112530 - WIRELESS FAULT INDICATORS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11253.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 12. WIRELESS FAULT INDICATORS
Workpaper Group: 112530 - WIRELESS FAULT INDICATORS

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	17	8	19	0	0	68	877	869
Non-Labor	Zero-Based	3,369	285	155	-687	5	272	3,509	3,476
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**3,386**	**293**	**174**	**-686**	**5**	**340**	**4,386**	**4,345**
FTE	Zero-Based	0.2	0.1	0.2	0.0	0.0	0.6	8.8	8.7

Business Purpose:

The purpose of this project is to provide a way to rapidly identify and locate faulted distribution circuits via wireless fault circuit indicators (FCI). This would reduce outage and repair times for reliability.

Physical Description:

The purpose of this project is to provide a way to rapidly identify and locate faulted distribution circuits via wireless fault circuit indicators (FCI). This would reduce outage and repair times for reliability; Change to: Wireless FCI's will be used to monitor lines and locate faults more efficiently and accurately due to more rapid pinpointing of line faults. When coupled with the On-Ramp Wireless system, the wireless FCI will communicate information to distribution system operators. This allows the operators to dispatch electric troubleshooters closer to the exact fault location to more quickly identify and isolate the fault and begin service restorations.

Project Justification:

Wireless FCI's will be installed to monitor lines and locate faults more efficiently and accurately due to more rapid pinpointing of line faults. When coupled with the On-Ramp Wireless system, the wireless FCI will communicate information to distribution system operators. This allows the operators to dispatch electric troubleshooters closer to the exact fault location to more quickly identify and isolate the fault and begin service restorations.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11253.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	12. WIRELESS FAULT INDICATORS
Workpaper Group:	112530 - WIRELESS FAULT INDICATORS

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11253.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 12. WIRELESS FAULT INDICATORS
Workpaper Group: 112530 - WIRELESS FAULT INDICATORS

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	68	877	869	0	0	0	68	877	869
Non-Labor	Zero-Based	272	3,509	3,476	0	0	0	272	3,509	3,476
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**340**	**4,386**	**4,345**	**0**	**0**	**0**	**340**	**4,386**	**4,345**
FTE	Zero-Based	0.6	8.8	8.7	0.0	0.0	0.0	0.6	8.8	8.7

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11253.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 12. WIRELESS FAULT INDICATORS
Workpaper Group: 112530 - WIRELESS FAULT INDICATORS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	14	6	16	0	0
Non-Labor	3,038	266	149	-677	5
NSE	0	0	0	0	0
Total	**3,051**	**272**	**165**	**-677**	**5**
FTE	0.2	0.1	0.2	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	14	6	16	0	0
Non-Labor	3,038	266	149	-677	5
NSE	0	0	0	0	0
Total	**3,051**	**272**	**165**	**-677**	**5**
FTE	0.2	0.1	0.2	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	2	1	2	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**2**	**1**	**2**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	2	1	1	0	0
Non-Labor	331	19	6	-9	0
NSE	0	0	0	0	0
Total	**333**	**19**	**6**	**-9**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	17	8	19	0	0
Non-Labor	3,369	285	155	-687	5
NSE	0	0	0	0	0
Total	**3,386**	**293**	**174**	**-686**	**5**
FTE	0.2	0.1	0.2	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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11253.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 12. WIRELESS FAULT INDICATORS
Workpaper Group: 112530 - WIRELESS FAULT INDICATORS

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 112530

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11253.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	12. WIRELESS FAULT INDICATORS
Workpaper Group:	112530 - WIRELESS FAULT INDICATORS
Workpaper Detail:	112530.001 - RAMP - Base - WIRELESS FAULT INDICATORS
In-Service Date:	Not Applicable

Description:

Wireless FCI s will be used to monitor lines and locate faults more efficiently and accurately due to more rapid pinpointing of line faults. When coupled with the On-Ramp Wireless system, the wireless FCI will communicate information to distribution system operators. This allows the operators to dispatch electric troubleshooters closer to the exact fault location to more quickly identify and isolate the fault and begin service restorations.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	68	877	869
Non-Labor	272	3,509	3,476
NSE	0	0	0
Total	**340**	**4,386**	**4,345**
FTE	0.6	8.8	8.7

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11253.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	12. WIRELESS FAULT INDICATORS
Workpaper Group:	112530 - WIRELESS FAULT INDICATORS
Workpaper Detail:	112530.001 - RAMP - Base - WIRELESS FAULT INDICATORS

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: Wireless Fault Indicator

Program Description: To provide a way to rapidly identify and locaste faulted distributio circuits via wireless fault indicators

Risk/Mitigation:

Risk: SDG&E-1

Mitigation: Design and Engineering Approaches

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 5

Explanation:

Beginning of Workpaper Group
112610 - SEWAGE PUMP STATION REBUILDS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11261.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 13. SEWAGE PUMP STATION REBUILDS
Workpaper Group: 112610 - SEWAGE PUMP STATION REBUILDS

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	17	3	0	25	433	346	231	0
Non-Labor	Zero-Based	3,495	24	16	609	1,179	1,200	100	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**3,512**	**27**	**17**	**634**	**1,611**	**1,546**	**331**	**0**
FTE	Zero-Based	0.1	0.0	0.0	0.2	3.6	3.5	2.3	0.0

Business Purpose:

The projects are rebuilds based on aging infrastructure and reliability of critical substations.The three stations that are being rebuilt pump all the sewage generated in the city and a large portion of the sewage generated in the county out to be treated before it is pumped into the Pacific Ocean. All three station need upgrade to the breakers and transformers as the electrical has reached the end of its life. The seismic performance will be evaluated and upgraded if needed.

Physical Description:

Point Loma Wastewater Treatment Plant requires significant amount of repairs in order to salvage some of the existing structures. Every bolt on the steel needs replace due to corrosion, all insulators show severe sign of corrosion. Equipment grounds have separated due to corrosion. Transformer fans are falling off due to corrosion suffered by 57 year old bank. All fuses and disconnect are corroded. Structural steel is corroded and need replacement. The breaker is an obsolete oil type that is also corroded. The transformer is has reached the end of it useful life and needs to be replace. In short, PLS is in desperate needs of a rebuild. In order to repair the structural steel on the same location would require outages longer then Point Loma waste water treatment plant is able to with stand. The facility can support itself with cogeneration but it is not preferred by the PLWTP. PLWTP indicated that is hesitant to let an outage go on for more three days. Repairing the existing facility in place would require a long outage or daily outage. Due to this constructability constraint repairing the existing structural steel is not recommended. Labor cost would be extremely high and new construction would take less time, less outage, assure a seismically qualified design to the latest standard and would cost less.
SPS2
Aging equipment needs replacement. The structure doesn't meet current seismic criteria. Repair existing structure is not possible due the logistics needed in order to keep the station energized. The switchgear does not have spare parts and the repairs needed are extensive. Small land lot also adds to the challenges of repairing it. The configuration makes extremely difficult to repair equipment, as the city will not allow long outages during their wet season (Sept through March).
SPS1
Aging equipment needs replacement. Structure doesn't meet current seismic criteria. Repair existing structure is not possible due the logistics needed in order to keep

Project Justification:

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11261.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	13. SEWAGE PUMP STATION REBUILDS
Workpaper Group:	112610 - SEWAGE PUMP STATION REBUILDS

"PLS
Point Loma Wastewater Treatment Plant requires significant amount of repairs in order to salvage some of the existing structures. Every bolt on the steel needs replace due to corrosion, all insulators show severe sign of corrosion. Equipment grounds have separated due to corrosion. Transformer fans are falling off due to corrosion suffered by 57 year old bank. All fuses and disconnect are corroded. Structural steel is corroded and need replacement. The breaker is an obsolete oil type that is also corroded. The transformer is has reached the end of it useful life and needs to be replace. In short, PLS is in desperate needs of a rebuild. In order to repair the structural steel on the same location would require outages longer then Point Loma waste water treatment plant is able to with stand. The facility can support itself with cogeneration but it is not preferred by the PLWTP. PLWTP indicated that is hesitant to let an outage go on for more three days. Repairing the existing facility in place would require a long outage or daily outage. Due to this constructability constraint repairing the existing structural steel is not recommended. Labor cost would be extremely high and new construction would take less time, less outage, assure a seismically qualified design to the latest standard and would cost less. SPS2
Aging equipment needs replacement. The structure doesn't meet current seismic criteria. Repair existing structure is not possible due the logistics needed in order to keep the station energized. The switchgear does not have spare parts and the repairs needed are extensive. Small land lot also adds to the challenges of repairing it.
The configuration makes extremely difficult to repair equipment, as the city will not allow long outages during their wet season (Sept through March).
SPS1
Aging equipment needs replacement. Structure doesn't meet current seismic criteria. Repair existing structure is not possible due the logistics needed in order to keep"

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11261.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	13. SEWAGE PUMP STATION REBUILDS
Workpaper Group:	112610 - SEWAGE PUMP STATION REBUILDS

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11261.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 13. SEWAGE PUMP STATION REBUILDS
Workpaper Group: 112610 - SEWAGE PUMP STATION REBUILDS

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	346	231	0	0	0	0	346	231	0
Non-Labor	Zero-Based	1,200	100	0	0	0	0	1,200	100	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**1,546**	**331**	**0**	**0**	**0**	**0**	**1,546**	**331**	**0**
FTE	Zero-Based	3.5	2.3	0.0	0.0	0.0	0.0	3.5	2.3	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11261.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 13. SEWAGE PUMP STATION REBUILDS
Workpaper Group: 112610 - SEWAGE PUMP STATION REBUILDS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	13	2	0	21	371
Non-Labor	3,151	23	16	601	1,179
NSE	0	0	0	0	0
Total	**3,165**	**25**	**16**	**622**	**1,550**
FTE	0.1	0.0	0.0	0.2	3.0
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	13	2	0	21	371
Non-Labor	3,151	23	16	601	1,179
NSE	0	0	0	0	0
Total	**3,165**	**25**	**16**	**622**	**1,550**
FTE	0.1	0.0	0.0	0.2	3.0
Vacation & Sick (Nominal $)					
Labor	2	0	0	3	62
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**2**	**0**	**0**	**3**	**62**
FTE	0.0	0.0	0.0	0.0	0.6
Escalation to 2016$					
Labor	2	0	0	0	0
Non-Labor	344	2	1	8	0
NSE	0	0	0	0	0
Total	**345**	**2**	**1**	**9**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	17	3	0	25	433
Non-Labor	3,495	24	16	609	1,179
NSE	0	0	0	0	0
Total	**3,512**	**27**	**17**	**634**	**1,611**
FTE	0.1	0.0	0.0	0.2	3.6

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11261.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 13. SEWAGE PUMP STATION REBUILDS
Workpaper Group: 112610 - SEWAGE PUMP STATION REBUILDS

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 112610

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11261.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	13. SEWAGE PUMP STATION REBUILDS
Workpaper Group:	112610 - SEWAGE PUMP STATION REBUILDS
Workpaper Detail:	112610.001 - RAMP - Incremental SEWAGE PUMP STATION REBUILDS
In-Service Date:	12/31/2018

Description:

This budget provides funding to rebuild three existing 12/4kV substations which feed City of San Diego owned sewage treatment and pump station facilities based on aging infrastructure and the goal of increased reliability. Point Loma Sewage, Sewage Pump Station #1, and Sewage Pump Station #2 are the three substations associated with this budget. The three stations that are being rebuilt feed the City's operation that pumps all the sewage generated in the city and a large portion of the sewage generated in the county out to be treated before it is pumped into the Pacific Ocean. All three stations need upgrades to the breakers and transformers, as the electrical equipment has reached the end of its life.
Information regarding the Sewage Pump Station Rebuilds is found in the capital work papers. See SDG&E-14-CWP at section 11261 – Sewage Pump Station Rebuilds.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	346	231	1
Non-Labor	1,200	100	0
NSE	0	0	0
Total	**1,546**	**331**	**1**
FTE	3.5	2.3	0.1

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11261.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	13. SEWAGE PUMP STATION REBUILDS
Workpaper Group:	112610 - SEWAGE PUMP STATION REBUILDS
Workpaper Detail:	112610.001 - RAMP - Incremental SEWAGE PUMP STATION REBUILDS

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Sewage Pump Station Rebuilds

Program Description: Rebuild of aging infrastructure

Risk/Mitigation:

Risk: Equipment Infrastructure Failure

Mitigation: Rebuild and repair aging infrustructure

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: .

Historical Embedded Cost Estimates ($000)

Embedded Costs: 1612

Explanation:

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11261.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 13. SEWAGE PUMP STATION REBUILDS
Workpaper Group: 112610 - SEWAGE PUMP STATION REBUILDS
Workpaper Detail: 112610.002 - RAMP - Base - Contractor Safety Program

In-Service Date: 03/31/2019

Description:

Contractor Safety Program RAMP

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	-1
Non-Labor	0	0	0
NSE	0	0	0
Total	**0**	**0**	**-1**
FTE	0.0	0.0	-0.1

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11261.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	13. SEWAGE PUMP STATION REBUILDS
Workpaper Group:	112610 - SEWAGE PUMP STATION REBUILDS
Workpaper Detail:	112610.002 - RAMP - Base - Contractor Safety Program

RAMP Item # 1

RAMP Chapter: SDG&E-3

Program Name: Contractor Safety Program

Program Description: Contractor Safety Program

Risk/Mitigation:

Risk: SDG&E-03

Mitigation: Contractor Safety Program

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	29,807	29,544	29,863
High	35,768	35,802	35,836

Funding Source: CPUC-GRC

Forecast Method: Other

Construction Start Date:

In Service Date:03/31/2019

Work Type: Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: This line item for Contractor Safety encompasses all budget codes. contractor safety is embeded in all the projects and administrated by a team of safety personnel. Also a small portion is part of Work Standards & Methods.The estimated 2016 embedded cost for this item is already entered in BC112610.001.

Beginning of Workpaper Group
112670 - SCADA EXPANSION-DISTRIBUTION - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11267.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 14. ADVANCED SCADA INFRASTRUCTURE (THE "SMART GRID")
Workpaper Group: 112670 - SCADA EXPANSION-DISTRIBUTION - RAMP

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	378	846	51	330	0	0	879	879
Non-Labor	Zero-Based	3,534	4,247	383	249	0	0	6,097	6,097
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**3,912**	**5,093**	**434**	**579**	**0**	**0**	**6,976**	**6,976**
FTE	Zero-Based	2.7	6.5	0.5	2.6	0.0	0.0	8.8	8.8

Business Purpose:

This project provies funding for the installation, upgrades and expansion of the Supervisory Control and Data Acquistion (SCADA) systems on distribution circuits.

Physical Description:

This project includes the new installation and expansion of the SCADA system on distribution circuits through the addition of automated switches.

Project Justification:

Lack of intelligent technology causes reliance on conventional outage troubleshooting methods. Prolonged outages (e.g. overnight) due to requirements to patrol during elevated operating conditions; extensive field exposure (distracted driving, etc.) for personnel. Lack of long term, granular circuit/branch data may impede proper infrastructure development plans or reliability system studies (e.g. categorizing types of faults with newer generations)

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11267.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	14. ADVANCED SCADA INFRASTRUCTURE (THE "SMART GRID")
Workpaper Group:	112670 - SCADA EXPANSION-DISTRIBUTION - RAMP

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11267.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 14. ADVANCED SCADA INFRASTRUCTURE (THE "SMART GRID")
Workpaper Group: 112670 - SCADA EXPANSION-DISTRIBUTION - RAMP

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	879	879	0	0	0	0	879	879
Non-Labor	Zero-Based	0	6,097	6,097	0	0	0	0	6,097	6,097
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**6,976**	**6,976**	**0**	**0**	**0**	**0**	**6,976**	**6,976**
FTE	Zero-Based	0.0	8.8	8.8	0.0	0.0	0.0	0.0	8.8	8.8

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11267.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 14. ADVANCED SCADA INFRASTRUCTURE (THE "SMART GRID")
Workpaper Group: 112670 - SCADA EXPANSION-DISTRIBUTION - RAMP

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	298	682	42	282	0
Non-Labor	3,187	3,968	369	245	0
NSE	0	0	0	0	0
Total	**3,485**	**4,650**	**411**	**527**	**0**
FTE	2.3	5.5	0.4	2.2	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	298	682	42	282	0
Non-Labor	3,187	3,968	369	245	0
NSE	0	0	0	0	0
Total	**3,485**	**4,650**	**411**	**527**	**0**
FTE	2.3	5.5	0.4	2.2	0.0
Vacation & Sick (Nominal $)					
Labor	43	108	7	44	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**43**	**108**	**7**	**44**	**0**
FTE	0.4	1.0	0.1	0.4	0.0
Escalation to 2016$					
Labor	37	56	2	5	0
Non-Labor	347	279	14	3	0
NSE	0	0	0	0	0
Total	**385**	**335**	**16**	**8**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	378	846	51	330	0
Non-Labor	3,534	4,247	383	249	0
NSE	0	0	0	0	0
Total	**3,912**	**5,093**	**434**	**579**	**0**
FTE	2.7	6.5	0.5	2.6	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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11267.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 14. ADVANCED SCADA INFRASTRUCTURE (THE "SMART GRID")
Workpaper Group: 112670 - SCADA EXPANSION-DISTRIBUTION - RAMP

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 112670

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11267.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	14. ADVANCED SCADA INFRASTRUCTURE (THE "SMART GRID")
Workpaper Group:	112670 - SCADA EXPANSION-DISTRIBUTION - RAMP
Workpaper Detail:	112670.001 - RAMP - Base - ADVANCED SCADA INFRASTRUCTURE (REFERRED TO AS THE SMART GR
In-Service Date:	Not Applicable

Description:

Expand and Maintain Distribution Advanced SCADA infrastructure

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	554	554
Non-Labor	0	3,841	3,841
NSE	0	0	0
Total	**0**	**4,395**	**4,395**
FTE	0.0	5.5	5.5

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11267.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	14. ADVANCED SCADA INFRASTRUCTURE (THE "SMART GRID")
Workpaper Group:	112670 - SCADA EXPANSION-DISTRIBUTION - RAMP
Workpaper Detail:	112670.001 - RAMP - Base - ADVANCED SCADA INFRASTRUCTURE (REFERRED TO AS THE SMART GRID

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Advanced SCADA infrastructure (formerly referred to as the Smart Grid Communication System)3

Program Description: Lack of intelligent technology causes reliance on conventional outage troubleshooting methods. Prolonged outages (e.g. overnight) due to requirements to patrol during elevated operating conditions; extensive field exposure (distracted driving, etc.) for personnel. Lack of long term, granular circuit/branch data may impede proper infrastructure development plans or reliability system studies (e.g. categorizing types of faults with newer generations).

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: System Modernization

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	2,479	2,479	2,479
High	3,223	3,223	3,223

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: This item is all related to RAMP

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11267.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	14. ADVANCED SCADA INFRASTRUCTURE (THE "SMART GRID")
Workpaper Group:	112670 - SCADA EXPANSION-DISTRIBUTION - RAMP
Workpaper Detail:	112670.002 - RAMP - Incremental ADVAN SCADA INFRASTR INSTALL OR MODERNIZE SCADA SYST IN S
In-Service Date:	Not Applicable

Description:

Expand and Maintain Distribution Advanced SCADA infrastructure in Substations

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	325	325
Non-Labor	0	2,256	2,256
NSE	0	0	0
Total	**0**	**2,581**	**2,581**
FTE	0.0	3.3	3.3

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11267.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	14. ADVANCED SCADA INFRASTRUCTURE (THE "SMART GRID")
Workpaper Group:	112670 - SCADA EXPANSION-DISTRIBUTION - RAMP
Workpaper Detail:	112670.002 - RAMP - Incremental ADVAN SCADA INFRASTR INSTALL OR MODERNIZE SCADA SYST IN SU

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Advanced SCADA infrastructure Install or modernize SCADA systems in substations (e.g. EM to MP or

Program Description: Replace, upgrade, or deploy new advanced relaying systems in substations to accommodate/enable distribution Advanced SCADA systems.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: System Modernization

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	2,000	2,000	2,000
High	2,600	2,600	2,600

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: N/A no historical cost

Beginning of Workpaper Group
122460 - ADVANCED GROUND FAULT DETECTION - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12246.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 15. ADVANCED GROUND FAULT DETECTION
Workpaper Group: 122460 - ADVANCED GROUND FAULT DETECTION - RAMP

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	60	66	107	138	75	80	80	80
Non-Labor	Zero-Based	721	12	32	182	152	241	241	241
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**781**	**78**	**139**	**320**	**227**	**321**	**321**	**321**
FTE	Zero-Based	0.5	0.6	0.9	1.3	0.7	0.8	0.8	0.8

Business Purpose:

This project will provide enhanced ground fault detection schemes for distribuiton circuits to allow for improved detection of downed conductors. As well as provide protective relay systems to detect high impedance faults, where the fault current may be very low and the resultant arcing fault may provide erratic current input to the protective relay. This effort will concentrate on protective relays on distribution feeder breakers in substations, and on pole-mounted service restorers on the distribution feeder. The advanced protective systems will provide faster isolation of downed conductors, promoting enhanced safety and improved service reliabilty.

Physical Description:

Install new equipment or upgrades at substations within high risk fire area and upgrade or install new service restorers.

Project Justification:

Improved public safety and reduced risk of fire ignition from downed conductors will result from the early detection and isolation of low-current intermittent ground faults. These "high impedance" faults are very difficult to detect with conventional protective relay applications. Newly enhanced equipment and algorithms are increasingly available for use of SDG&E's distribution system in both new installation and existing device upgrade applications. Project costs are relatively small and the scope will integrate well with other company efforts to maximize safe operation of our distribution system infrastructure. And the additional SCADA data retrived from the new algorithms will furhter improve the knowledge base regarding high-impedance faults specific to SDG&E's service territor.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12246.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	15. ADVANCED GROUND FAULT DETECTION
Workpaper Group:	122460 - ADVANCED GROUND FAULT DETECTION - RAMP

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12246.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 15. ADVANCED GROUND FAULT DETECTION
Workpaper Group: 122460 - ADVANCED GROUND FAULT DETECTION - RAMP

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	80	80	80	0	0	0	80	80	80
Non-Labor	Zero-Based	241	241	241	0	0	0	241	241	241
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**321**	**321**	**321**	**0**	**0**	**0**	**321**	**321**	**321**
FTE	Zero-Based	0.8	0.8	0.8	0.0	0.0	0.0	0.8	0.8	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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12246.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 15. ADVANCED GROUND FAULT DETECTION
Workpaper Group: 122460 - ADVANCED GROUND FAULT DETECTION - RAMP

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	48	54	89	118	64
Non-Labor	650	11	31	179	152
NSE	0	0	0	0	0
Total	**697**	**64**	**120**	**297**	**216**
FTE	0.4	0.5	0.8	1.1	0.5
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	48	54	89	118	64
Non-Labor	650	11	31	179	152
NSE	0	0	0	0	0
Total	**697**	**64**	**120**	**297**	**216**
FTE	0.4	0.5	0.8	1.1	0.5
Vacation & Sick (Nominal $)					
Labor	7	8	14	18	11
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**7**	**8**	**14**	**18**	**11**
FTE	0.1	0.1	0.1	0.2	0.1
Escalation to 2016$					
Labor	6	4	4	2	0
Non-Labor	71	1	1	2	0
NSE	0	0	0	0	0
Total	**77**	**5**	**5**	**4**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	60	66	107	138	75
Non-Labor	721	12	32	182	152
NSE	0	0	0	0	0
Total	**781**	**78**	**139**	**320**	**227**
FTE	0.5	0.6	0.9	1.3	0.6

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12246.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 15. ADVANCED GROUND FAULT DETECTION
Workpaper Group: 122460 - ADVANCED GROUND FAULT DETECTION - RAMP

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 122460

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12246.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 15. ADVANCED GROUND FAULT DETECTION
Workpaper Group: 122460 - ADVANCED GROUND FAULT DETECTION - RAMP
Workpaper Detail: 122460.001 - RAMP - Base - ADVANCED GROUND FAULT DETECTION

In-Service Date: Not Applicable

Description:

Reclosers coupled with SCADA resources provide operations with the real time capability to shut off portions of circuits for safety related reasons casused by high winds and weather.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	80	80	80
Non-Labor	241	241	241
NSE	0	0	0
Total	**321**	**321**	**321**
FTE	0.8	0.8	0.8

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12246.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	15. ADVANCED GROUND FAULT DETECTION
Workpaper Group:	122460 - ADVANCED GROUND FAULT DETECTION - RAMP
Workpaper Detail:	122460.001 - RAMP - Base - ADVANCED GROUND FAULT DETECTION

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: Adv Ground Fault Detection, Phasor Measurement Units - Distribution, SCADA Capacitors, Smart Isoloat

Program Description: Reclosers coupled with SCADA resources provide operations with the real time capability to shut off portions of circuits for safety related reasons casused by high winds and weather.

Risk/Mitigation:

Risk: SDG&E Wildfires

Mitigation: Advanced Protection

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	10,675	10,675	10,678
High	13,878	13,878	13,878

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 227

Explanation: This item is all related to RAMPNote - Advanced protection RAMP encompasses the following budget codes 12246-12243-12247-11253-11249

Beginning of Workpaper Group
122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12249.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 16. Weather Stations
Workpaper Group: 122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE

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	12	38	3	0	4	58	58	275
Non-Labor	Zero-Based	796	697	398	441	0	150	150	713
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**808**	**735**	**401**	**441**	**4**	**208**	**208**	**988**
FTE	Zero-Based	0.1	0.4	0.0	0.0	0.0	0.6	0.6	2.8

Business Purpose:

This budget provides funding to further modernize the SDG&E weather network, which is currently the largest network of its kind anywhere in the country. This weather network brings superior situational awareness for the weather conditions impacting the electric and gas system, supporting daily operations and emergency operations. The weather network also serves as a data foundation for high performance computer modeling which generates multiple analytical tools that are used across the organization.

Physical Description:

This budget aims to replace aging sensors and equipment with the latest technology. This will include new thermometers, hygrometers, anemometers, batteries, solar panels, modems, and in some cases pyrometers. Much of this equipment has reached its life expectancy of 3-5 years and a proactive modification of this instrumentation will be necessary to keep the network running efficiently into the future.

Project Justification:

This budget aims to replace aging sensors and equipment with the latest technology. This will include new thermometers, hygrometers, anemometers, batteries, solar panels, modems, and in some cases pyrometers. Much of this equipment has reached its life expectancy of 3-5 years and a proactive modification of this instrumentation will be necessary to keep the network running efficiently into the future.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12249.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	16. Weather Stations
Workpaper Group:	122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12249.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 16. Weather Stations
Workpaper Group: 122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE

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	58	58	275	0	0	0	58	58	275
Non-Labor	Zero-Based	150	150	713	0	0	0	150	150	713
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**208**	**208**	**988**	**0**	**0**	**0**	**208**	**208**	**988**
FTE	Zero-Based	0.6	0.6	2.8	0.0	0.0	0.0	0.6	0.6	2.8

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12249.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 16. Weather Stations
Workpaper Group: 122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	9	30	3	0	4
Non-Labor	718	651	383	435	0
NSE	0	0	0	0	0
Total	**727**	**681**	**386**	**435**	**4**
FTE	0.1	0.3	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	9	30	3	0	4
Non-Labor	718	651	383	435	0
NSE	0	0	0	0	0
Total	**727**	**681**	**386**	**435**	**4**
FTE	0.1	0.3	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	1	5	0	0	1
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**1**	**5**	**0**	**0**	**1**
FTE	0.0	0.1	0.0	0.0	0.0
Escalation to 2016$					
Labor	1	2	0	0	0
Non-Labor	78	46	15	6	0
NSE	0	0	0	0	0
Total	**79**	**48**	**15**	**6**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	12	38	3	0	4
Non-Labor	796	697	398	441	0
NSE	0	0	0	0	0
Total	**808**	**735**	**401**	**441**	**4**
FTE	0.1	0.4	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12249.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 16. Weather Stations
Workpaper Group: 122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE

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 122490

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12249.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	16. Weather Stations
Workpaper Group:	122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE
Workpaper Detail:	122490.001 - RAMP - Base - Weather Stations
In-Service Date:	Not Applicable

Description:

Weather Stations

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	58	58	58
Non-Labor	150	150	150
NSE	0	0	0
Total	**208**	**208**	**208**
FTE	0.6	0.6	0.6

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12249.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	16. Weather Stations
Workpaper Group:	122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE
Workpaper Detail:	122490.001 - RAMP - Base - Weather Stations

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: Weather Stations

Program Description: Use of weather stations and correlation with Fire Protection Index. The life span on weather equipment is 3-5 years and the sensors will need replacing periodically. There is also a web based forecasting system behind the FPI that needs maintenance.

Risk/Mitigation:

Risk: SDG&E Wildfires

Mitigation: Advanced Detection

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	200	200	200
High	260	260	260

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 4

Explanation: This item is all related to RAMP

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12249.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	16. Weather Stations
Workpaper Group:	122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE
Workpaper Detail:	122490.002 - RAMP - Base Circuit by circuit weather forecasting models to support CFSP resulting i
In-Service Date:	Not Applicable

Description:

Circuit by circuit weather forecasting models to support CFSP & resulting implementation.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	217
Non-Labor	0	0	563
NSE	0	0	0
Total	**0**	**0**	**780**
FTE	0.0	0.0	2.2

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12249.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	16. Weather Stations
Workpaper Group:	122490 - RAMP Base - ADVANCED WEATHER STA. INTEGRATION & FORE
Workpaper Detail:	122490.002 - RAMP - Base Circuit by circuit weather forecasting models to support CFSP resulting implementat

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: Weather Forecasting Models

Program Description: Maintain, replace, recalibrate and check over 170 weather stations within service territory. Regular upgrade of computer hardware and processors to run data analytics

Risk/Mitigation:

Risk: SDG&E Wildfires

Mitigation: Monitoring and Detection

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	750
High	0	0	975

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: The estimated 2016 embedded cost for this item is already entered in BC122490.001

Beginning of Workpaper Group
122660 - CONDITION BASED MAINTENANCE-SMART GRID

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12266.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 17. Condition Based Maintenance -Smart Grid
Workpaper Group: 122660 - CONDITION BASED MAINTENANCE-SMART GRID

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	13	686	434	149	123	346	346	346
Non-Labor	Zero-Based	1,256	3,360	1,473	747	293	1,200	1,200	1,200
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**1,268**	**4,045**	**1,907**	**896**	**416**	**1,546**	**1,546**	**1,546**
FTE	Zero-Based	0.1	6.2	4.1	1.4	0.9	3.5	3.5	3.5

Business Purpose:

Implement advanced technologies to monitor the health of critical distribution substation assets.

Physical Description:

Install Condition Based Maintenance monitoring equipment on distribution facilities in SDG&E substations.

Project Justification:

The CBM project benefits are centered around better understanding of the health of assets so that proper maintenance activities are identified and performed as needed to achieve greater asset utilization and longevity of use. Additionally, the CBM project has a dependency from the OMS/DMS system which will use portions of the real-time asset information generated by the CBM system to dynamically rate substation transformer load capacity which provides operational benefits aligned with the Smart Grid Deployment plan.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12266.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	17. Condition Based Maintenance -Smart Grid
Workpaper Group:	122660 - CONDITION BASED MAINTENANCE-SMART GRID

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12266.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 17. Condition Based Maintenance -Smart Grid
Workpaper Group: 122660 - CONDITION BASED MAINTENANCE-SMART GRID

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	346	346	346	0	0	0	346	346	346
Non-Labor	Zero-Based	1,200	1,200	1,200	0	0	0	1,200	1,200	1,200
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**1,546**	**1,546**	**1,546**	**0**	**0**	**0**	**1,546**	**1,546**	**1,546**
FTE	Zero-Based	3.5	3.5	3.5	0.0	0.0	0.0	3.5	3.5	3.5

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12266.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 17. Condition Based Maintenance -Smart Grid
Workpaper Group: 122660 - CONDITION BASED MAINTENANCE-SMART GRID

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	10	553	360	127	105
Non-Labor	1,132	3,138	1,419	737	293
NSE	0	0	0	0	0
Total	**1,142**	**3,691**	**1,779**	**864**	**398**
FTE	0.1	5.3	3.5	1.2	0.8
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	10	553	360	127	105
Non-Labor	1,132	3,138	1,419	737	293
NSE	0	0	0	0	0
Total	**1,142**	**3,691**	**1,779**	**864**	**398**
FTE	0.1	5.3	3.5	1.2	0.8
Vacation & Sick (Nominal $)					
Labor	1	88	58	20	17
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**1**	**88**	**58**	**20**	**17**
FTE	0.0	0.9	0.6	0.2	0.1
Escalation to 2016$					
Labor	1	45	16	2	0
Non-Labor	123	221	55	10	0
NSE	0	0	0	0	0
Total	**125**	**266**	**71**	**12**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	13	686	434	149	123
Non-Labor	1,256	3,360	1,473	747	293
NSE	0	0	0	0	0
Total	**1,268**	**4,045**	**1,907**	**896**	**416**
FTE	0.1	6.2	4.1	1.4	0.9

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12266.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 17. Condition Based Maintenance -Smart Grid
Workpaper Group: 122660 - CONDITION BASED MAINTENANCE-SMART GRID

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 122660

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12266.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	17. Condition Based Maintenance -Smart Grid
Workpaper Group:	122660 - CONDITION BASED MAINTENANCE-SMART GRID
Workpaper Detail:	122660.001 - RAMP - Base - Condition Based Maintenance -Smart Grid
In-Service Date:	Not Applicable

Description:

Implement advanced technologies to monitor the health of critical distribution substation assets.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	346	346	346
Non-Labor	1,200	1,200	1,200
NSE	0	0	0
Total	**1,546**	**1,546**	**1,546**
FTE	3.5	3.5	3.5

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12266.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	17. Condition Based Maintenance -Smart Grid
Workpaper Group:	122660 - CONDITION BASED MAINTENANCE-SMART GRID
Workpaper Detail:	122660.001 - RAMP - Base - Condition Based Maintenance -Smart Grid

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: CBM - Distribution

Program Description: Operational risks due to infrastructure failing prematurely. Lack of insight regarding failure data presents potential long term operational volatility.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Conditioned Based Monitroing System

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	500	0	0
High	650	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 416

Explanation: This item is all related to RAMP

Beginning of Workpaper Group
132420 - Rebuild Kearny 69/12kV Substation

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13242.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 18. Rebuild Kearny 69/12kV Substation
Workpaper Group: 132420 - Rebuild Kearny 69/12kV Substation

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	6	9	3	82	1,128	600	0
Non-Labor	Zero-Based	0	78	33	79	3,094	3,372	6,400	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**85**	**41**	**82**	**3,176**	**4,500**	**7,000**	**0**
FTE	Zero-Based	0.0	0.0	0.1	0.0	1.0	11.3	6.0	0.0

Business Purpose:

Kearny Substation, built in 1968, ranks in the top percentile of the SEA team's ranking based on number of substation outages. It currently feeds the San Diego County Emergency Operation Center and in late 2017 will feed the new Kaiser Hospital proposed to be built approximately ½ mile from Kearny substation. Approximately 4MW of load from this hospital will be served by this substation. With this load addition, Kearny will be at 93% capacity which will drive the need for a 4th bank addition for reliability and future capacity. Due to the current configuration of the substation, the substation will have to expand in order to add this fourth bank and associated 12kV equipment. This expansion will require the substation to be relocated (to a new site in the Kearny facility) since its' current site can not be expanded to accommodate all the issues that need to be addressed, including:

- Replacement of the 69kV cap&pin glass which is failing
- Replacement of the 12kV cap&pin glass which is of the same age as the 69kV glass
- Replacement of the 39 year old 12kV switchgear.
- Replacement of the 39 year old bus tie cable probably
- Replacement of six transmission oil breakers
- Replacement of eight distribution oil breakers.
- Replacemnt and upgrades of 12kV capacitors and elimination of them off 12kV bus fused disconnects
- Installation of two additional 12kV bus ties.
- Improved seismic ratings of structures and equipment

Physical Description:

The Kearny Substation rebuild will consist of relocating the existing installation to the west side of the Kearny facility on a larger and more suitable location to accommodate a low profile 120MVA substation. The relocation will be on the existing Kearny facility property zoned for utility use, and therefore will not be subject to any permits.It will be rebuilt on the site once utilized by transformer oil tanks, in the southwest corner of the Kearny facility. This site will allow space for all required expansion to meet existing and projected electric distribution load growth and the ultimate arrangement will allow for feeds to existing generators and proposed battery storage area.It is anticipated that the rebuild will improve Kearny's reliability by 98%. The ultimate arrangement of the substation will consist of five 69kV bays consisting of five 69 kV TL breakers, one 69kV bus tie breaker, four 69 kV bank breakers, one 69kV ground bank and associated breaker, four 30 MVA 69/12 kV low profile transformers, four ¼ sections of switchgear, four 12 kV capacitors, one new control shelter, new relaying, SCADA, five 69 kV transmission lines, and sixteen distribution circuits.

Project Justification:

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13242.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	18. Rebuild Kearny 69/12kV Substation
Workpaper Group:	132420 - Rebuild Kearny 69/12kV Substation

Kearny Substation ranks #2 in number of substation outages of SDG&E's substation fleet. The capacity of the existing substation cannot be expanded to a fourth bank which is required for reliability in 2017 to serve the new Kaiser Hospital and to meet projected electric distribution load growth in the Kearny Mesa area. Kearny Substation consists of aging infrastructure, including failing 69kV and 12kV glass, aging 12kV metalclad switchgear, non-standard bus tie arrangement, six transmission and eight distribution breakers designated for replacement, and four 12kV capacitors which need to be replaced and constructed off of 12kV breaker positions.

The timeframe of this project coordinates with the reconductor/undergrounding of TL 663 (Mission – Kearny) project.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13242.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	18. Rebuild Kearny 69/12kV Substation
Workpaper Group:	132420 - Rebuild Kearny 69/12kV Substation

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13242.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 18. Rebuild Kearny 69/12kV Substation
Workpaper Group: 132420 - Rebuild Kearny 69/12kV Substation

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	1,128	600	0	0	0	0	1,128	600	0
Non-Labor	Zero-Based	3,372	6,400	0	0	0	0	3,372	6,400	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**4,500**	**7,000**	**0**	**0**	**0**	**0**	**4,500**	**7,000**	**0**
FTE	Zero-Based	11.3	6.0	0.0	0.0	0.0	0.0	11.3	6.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13242.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 18. Rebuild Kearny 69/12kV Substation
Workpaper Group: 132420 - Rebuild Kearny 69/12kV Substation

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	5	7	2	70
Non-Labor	0	73	31	78	3,094
NSE	0	0	0	0	0
Total	**0**	**78**	**39**	**81**	**3,165**
FTE	0.0	0.0	0.1	0.0	0.8
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	5	7	2	70
Non-Labor	0	73	31	78	3,094
NSE	0	0	0	0	0
Total	**0**	**78**	**39**	**81**	**3,165**
FTE	0.0	0.0	0.1	0.0	0.8
Vacation & Sick (Nominal $)					
Labor	0	1	1	0	12
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**1**	**1**	**0**	**12**
FTE	0.0	0.0	0.0	0.0	0.2
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	5	1	1	0
NSE	0	0	0	0	0
Total	**0**	**6**	**2**	**1**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	6	9	3	82
Non-Labor	0	78	33	79	3,094
NSE	0	0	0	0	0
Total	**0**	**85**	**41**	**82**	**3,176**
FTE	0.0	0.0	0.1	0.0	1.0

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13242.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 18. Rebuild Kearny 69/12kV Substation
Workpaper Group: 132420 - Rebuild Kearny 69/12kV Substation

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 132420

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13242.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	18. Rebuild Kearny 69/12kV Substation
Workpaper Group:	132420 - Rebuild Kearny 69/12kV Substation
Workpaper Detail:	132420.001 - Rebuild Kearny 69/12kV Substation
In-Service Date:	06/30/2018

Description:

The Kearny Substation rebuild will consist of relocating the existing installation to the west side of the Kearny facility on a larger and more suitable location to accommodate a low profile 120MVA substation. The relocation will be on the existing Kearny facility property zoned for utility use, and therefore will not be subject to any permits.It will be rebuilt on the site once utilized by transformer oil tanks, in the southwest corner of the Kearny facility. This site will allow space for all required expansion to meet existing and projected electric distribution load growth and the ultimate arrangement will allow for feeds to existing generators and proposed battery storage area.It is anticipated that the rebuild will improve Kearny's reliability by 98%.

The ultimate arrangement of the substation will consist of five 69kV bays consisting of five 69 kV TL breakers, one 69kV bus tie breaker, four 69 kV bank breakers, one 69kV ground bank and associated breaker, four 30 MVA 69/12 kV low profile transformers, four ¼ sections of switchgear, four 12 kV capacitors, one new control shelter, new relaying, SCADA, five 69 kV transmission lines, and sixteen distribution circuits.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	1,128	600	0
Non-Labor	3,372	6,400	0
NSE	0	0	0
Total	**4,500**	**7,000**	**0**
FTE	11.3	6.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
132440 - STREAMVIEW 69/12KV SUB REBUILD-PRE ENG

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13244.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 19. 13244 STREAMVIEW 69/12KV Sub Rebuild-Pre Eng
Workpaper Group: 132440 - STREAMVIEW 69/12KV SUB REBUILD-PRE ENG

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	2	3	0	0	0	0	0
Non-Labor	Zero-Based	0	12	1	0	0	50	50	50
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**14**	**5**	**0**	**0**	**50**	**50**	**50**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

This budget provides funding for pre-engineering perfomed in support of rebuilding existing Streamview Substation.

Physical Description:

The pre-engineering being funded on this project aims to facilitate the rebuild of Streamview Substation to an ultimate capacity of 120MVA, four transmission bank substation and will also improve tie capacity in the College area. The Project will also be necessary to increase substation capacity.

Project Justification:

This budget provides funding for the purchase of land adjacent to existing Streamview Substation along with the pre-engineering required to rebuild the facility. This project will rebuild Streamview Substation to an ultimate capacity of 120MVA, four transmission bank substation and will also improve tie capacity in the College area. The Project will also be necessary to increase substation capacity.
Information regarding the Streamview 69/12kV Substation rebuild is found in the capital work papers. See SDG&E-14-CWP at section 13244 – Streamview 69/12kV Sub Rebuild.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13244.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	19. 13244 STREAMVIEW 69/12KV Sub Rebuild-Pre Eng
Workpaper Group:	132440 - STREAMVIEW 69/12KV SUB REBUILD-PRE ENG

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

NA

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13244.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 19. 13244 STREAMVIEW 69/12KV Sub Rebuild-Pre Eng
Workpaper Group: 132440 - STREAMVIEW 69/12KV SUB REBUILD-PRE ENG

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	50	50	50	0	0	0	50	50	50
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**50**	**50**	**50**	**0**	**0**	**0**	**50**	**50**	**50**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13244.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 19. 13244 STREAMVIEW 69/12KV Sub Rebuild-Pre Eng
Workpaper Group: 132440 - STREAMVIEW 69/12KV SUB REBUILD-PRE ENG

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	1	3	0	0
Non-Labor	0	12	1	0	0
NSE	0	0	0	0	0
Total	**0**	**13**	**4**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	1	3	0	0
Non-Labor	0	12	1	0	0
NSE	0	0	0	0	0
Total	**0**	**13**	**4**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	1	0	0	0
NSE	0	0	0	0	0
Total	**0**	**1**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	2	3	0	0
Non-Labor	0	12	1	0	0
NSE	0	0	0	0	0
Total	**0**	**14**	**5**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13244.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 19. 13244 STREAMVIEW 69/12KV Sub Rebuild-Pre Eng
Workpaper Group: 132440 - STREAMVIEW 69/12KV SUB REBUILD-PRE ENG

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 132440

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13244.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	19. 13244 STREAMVIEW 69/12KV Sub Rebuild-Pre Eng
Workpaper Group:	132440 - STREAMVIEW 69/12KV SUB REBUILD-PRE ENG
Workpaper Detail:	132440.001 - 13244 STREAMVIEW 69/12KV Sub Rebuild-Pre Eng
In-Service Date:	12/31/2019

Description:

13244 STREAMVIEW 69/12KV Sub Rebuild-Pre Eng

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	50	50	50
NSE	0	0	0
Total	**50**	**50**	**50**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
14143A - POWAY SUBSTATION REBUILD

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14143.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 21. POWAY SUBSTATION REBUILD
Workpaper Group: 14143A - POWAY SUBSTATION REBUILD

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	46	0	0
Non-Labor	Zero-Based	0	0	0	0	0	131	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**177**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0

Business Purpose:

Poway Substation needs SCADA control and a new control shelter to accommodate the need to expand the substation to have four (4) 69kV transmission lines (TL).

Physical Description:

Transmission: Underground the three TLs going into Poway Sub. Make provisions for a 4th TL.

Substation: Rebuild Poway 69kV substation to the standard low profile substation and rebuild the control shelter.This includes site development for extending the fence, rebuilding the transmission bus and constructing four (4) TL termination structures.

Ulitmately, the substation will rebuild the distribution portion by installing two (2) new 30MVA 69/12kV low profile transformers, two (2) 12kV metal clad switchgear, two (2) 12kV 7200MVAR cap banks, one (1) 69kV 50MVAR cap bank, and associated disconnects and breakers.

Project Justification:

- SUBSTATION

Start of electrical and structural design for substation is schedule for first quarter of 2015.
Start of construction is set for fourth quarter of 2015.
o Cultural Investigation
o Preliminary undergrounding work for distribution and transmission circuits to clear the site of poles in order to start site development work for the new substation.
o Termination stand structures for the 3 tie lines
o Site development for new substation footprint and extend the substation fence within our property.
o Build new 69kV low profile bus with associated disconnects and circuit breakers for four (4) TLs, bus-tie, and two (2) transformers.
o Puchase two seven (7) 69kV GCBs
o Build new standard 20'x40' control shelter
o Upgrade protection relays and panels for opposite ends of the TLs: TL648 at RCL, TL6913 at POM, TL634 at WC and ESCO.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14143.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	21. POWAY SUBSTATION REBUILD
Workpaper Group:	14143A - POWAY SUBSTATION REBUILD

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 14143A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14143.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	21. POWAY SUBSTATION REBUILD
Workpaper Group:	14143A - POWAY SUBSTATION REBUILD
Workpaper Detail:	14143A.001 - POWAY SUBSTATION REBUILD
In-Service Date:	10/31/2017

Description:

POWAY SUBSTATION REBUILD

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	46	0	0
Non-Labor	131	0	0
NSE	0	0	0
Total	**177**	**0**	**0**
FTE	0.5	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
152430 - SUBSTATION SCADA EXPANSION-DISTRIBUTION

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 22. SUBSTATION SCADA EXPANSION-DISTRIBUTION
Workpaper Group: 152430 - SUBSTATION SCADA EXPANSION-DISTRIBUTION

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	321	167	289	0
Non-Labor	Zero-Based	0	0	0	0	740	380	265	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**1,061**	**547**	**554**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	2.6	1.7	2.9	0.0

Business Purpose:

This project provides funding for the installation, upgrades, and expansion of the Supervisory Control and Data Acquisition (SCADA) system at substations for the distribution portion in substations.

Physical Description:

Install distribution SCADA at various substations.

Project Justification:

Benefits of installing SCADA include:
1. Faster faulted circuit identifications
2. Faster isolation of faulted electric distribution circuits
3. Faster load restoration when system disturbances occur
4. Better system performance by mitigating electric system deficiencies

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15243.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	22. SUBSTATION SCADA EXPANSION-DISTRIBUTION
Workpaper Group:	152430 - SUBSTATION SCADA EXPANSION-DISTRIBUTION

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 22. SUBSTATION SCADA EXPANSION-DISTRIBUTION
Workpaper Group: 152430 - SUBSTATION SCADA EXPANSION-DISTRIBUTION

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	167	289	0	167	289	0
Non-Labor	Zero-Based	0	0	0	380	265	0	380	265	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**547**	**554**	**0**	**547**	**554**	**0**
FTE	Zero-Based	0.0	0.0	0.0	1.7	2.9	0.0	1.7	2.9	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 22. SUBSTATION SCADA EXPANSION-DISTRIBUTION
Workpaper Group: 152430 - SUBSTATION SCADA EXPANSION-DISTRIBUTION

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	275
Non-Labor	0	0	0	0	740
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**1,016**
FTE	0.0	0.0	0.0	0.0	2.2
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	0	0	0	0	275
Non-Labor	0	0	0	0	740
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**1,016**
FTE	0.0	0.0	0.0	0.0	2.2
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	46
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**46**
FTE	0.0	0.0	0.0	0.0	0.4
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	321
Non-Labor	0	0	0	0	740
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**1,061**
FTE	0.0	0.0	0.0	0.0	2.6

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 22. SUBSTATION SCADA EXPANSION-DISTRIBUTION
Workpaper Group: 152430 - SUBSTATION SCADA EXPANSION-DISTRIBUTION

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 152430

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15243.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	22. SUBSTATION SCADA EXPANSION-DISTRIBUTION
Workpaper Group:	152430 - SUBSTATION SCADA EXPANSION-DISTRIBUTION
Workpaper Detail:	152430.001 - SUBSTATION SCADA EXPANSION-DISTRIBUTION
In-Service Date:	12/31/2018

Description:

Install distribution SCADA at various substations.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	167	289	0
Non-Labor	380	265	0
NSE	0	0	0
Total	**547**	**554**	**0**
FTE	1.7	2.9	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
162440 - METEOROLOGY-OUTAGE PREDICTION MODELING

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16244.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 23. METEOROLOGY-OUTAGE PREDICTION MODELING P2
Workpaper Group: 162440 - METEOROLOGY-OUTAGE PREDICTION MODELING

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	369	0	0
Non-Labor	Zero-Based	0	0	0	0	720	320	0	0
NSE	Zero-Based	0	0	0	0	0	28	0	0
Total		**0**	**0**	**0**	**0**	**720**	**717**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0

Business Purpose:

We will use the weather models built to support our Community Fire Safety Plan (CFSP) and integrate these models into outage prediction algorithms. The predicted outages will then be fed into our OMS system providing decision support for storm operations. The outages will be predicted per district with greater than 75% accuracy.

Physical Description:

This project will use data analytics and historical outage data to predict the impacts from winter storms, lightning storms, or any adverse weather events. Comprehensive models have been built in 2016, phase two will finalize model verification, information visualization and deployment.

Project Justification:

Weather is the number one impact on the electric system and this system will work to quantify the weather related impacts that we may experience on the system 365 days a year using state of the art computing techniques. Just as the Fire Potential Index (FPI) has been able to streamline our response to wildfire potential, this new model will streamline our ability to respond to the outage potential on the system.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16244.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	23. METEOROLOGY-OUTAGE PREDICTION MODELING P2
Workpaper Group:	162440 - METEOROLOGY-OUTAGE PREDICTION MODELING

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16244.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 23. METEOROLOGY-OUTAGE PREDICTION MODELING P2
Workpaper Group: 162440 - METEOROLOGY-OUTAGE PREDICTION MODELING

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	369	0	0	369	0	0
Non-Labor	Zero-Based	0	0	0	320	0	0	320	0	0
NSE	Zero-Based	0	0	0	28	0	0	28	0	0
Total		**0**	**0**	**0**	**717**	**0**	**0**	**717**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	3.7	0.0	0.0	3.7	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16244.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 23. METEOROLOGY-OUTAGE PREDICTION MODELING P2
Workpaper Group: 162440 - METEOROLOGY-OUTAGE PREDICTION MODELING

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	720
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**720**
FTE	0.0	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	720
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**720**
FTE	0.0	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	720
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**720**
FTE	0.0	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16244.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 23. METEOROLOGY-OUTAGE PREDICTION MODELING P2
Workpaper Group: 162440 - METEOROLOGY-OUTAGE PREDICTION MODELING

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 162440

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16244.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 23. METEOROLOGY-OUTAGE PREDICTION MODELING P2
Workpaper Group: 162440 - METEOROLOGY-OUTAGE PREDICTION MODELING
Workpaper Detail: 162440.001 - METEOROLOGY-OUTAGE PREDICTION MODELING P2

In-Service Date: 11/30/2017

Description:

This project will use data analytics and historical outage data to predict the impacts from winter storms, lightning storms, or any adverse weather events. Comprehensive models have been built in 2016, phase two will finalize model verification, information visualization and deployment.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	369	0	0
Non-Labor	320	0	0
NSE	28	0	0
Total	**717**	**0**	**0**
FTE	3.7	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
16245A - This project will modernize and operationalize fire behavior modeling. Phase two seeks to conduct da

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16245.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 24. modernize and operationalize fire behavior
Workpaper Group: 16245A - This project will modernize and operationalize fire behavior modeling. Phase two seeks to conduct da

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	250	0	0
NSE	Zero-Based	0	0	0	0	0	22	0	0
Total		**0**	**0**	**0**	**0**	**0**	**272**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

This project will take results from predictive models of wind location/intensity and integrate them into an operational tool. This tool will yield daily assessments of fire threat, which the system operators will associate with potential system failures. Each potential failure will be analyzed together with forecasted weather and fuels information to assess fire growth potential and the impacts to the company and the community, should an ignition occur. The resulting daily risk assessment report will support the safe and reliable operation of the system, e.g. the implementation of sensitive relay settings, staging crews, Capstone staging and reclosing functions.

Physical Description:

This project will modernize and operationalize fire behavior modeling by leveraging the technology developed to run the Wildfire Risk Reduction Model and run that operationally using high performance computing. Each day when the SDG&E Meteorology team runs its weather forecasts and fuels analysis, the digitized output will feed directly into a devoted server that will then use that information to simulate thousands of ignitions across the service territory. Based upon the growth pattern of the fires, we are able to take that intellgence to present a risk assessment to operations so that they will be able to effectively staff.

Project Justification:

Meteorology has worked closely with our Fire Coordination group to enhance the fire science that is integrated into our company's operational decision making. Meteorology has also built state of the art prediction models to forecast the location and intensity of winds that can damage our electric system, though rapid and catastrophic wildfire growth across our service territory. The objective is to leverage all of the investment in wildfire situational awareness and integrate this into a single tool. For example, integrate all of the data generated by the wildfire models into the Wildfire Risk Reduction Model (WRRM), thus calculating real time risk on the system, so as to prioritize staging and assist operational decision support. In addition to being used as a daily threat assessment and decision support tool, this will also have the ability to be used as an emergency management tool should a large fire start in our service territory. This tool will be able to predict fire perimeters using the latest fire science and weather technology that SDG&E has developed. We will be able to integrate the model output into a geospatial environment that will enable our Fire Coordination team to quickly determine which portions of the distribution and transmission system are threatened.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16245.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	24. modernize and operationalize fire behavior
Workpaper Group:	16245A - This project will modernize and operationalize fire behavior modeling. Phase two seeks to conduct c

Forecast Methodology:

Labor - Zero-Based

N/A

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Beginning of Workpaper Sub Details for
Workpaper Group 16245A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16245.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	24. modernize and operationalize fire behavior
Workpaper Group:	16245A - This project will modernize and operationalize fire behavior modeling. Phase two seeks to c
Workpaper Detail:	16245A.001 - This project will modernize and operationalize fire behavior modeling.
In-Service Date:	09/30/2017

Description:

This project will modernize and operationalize fire behavior modeling. Phase two seeks to conduct data verification and enhancements to the data visualization platform.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	0
Non-Labor	250	0	0
NSE	22	0	0
Total	**272**	**0**	**0**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
162570 - Vault Restoration

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16257.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 25. VAULT MAINTENANCE
Workpaper Group: 162570 - Vault Restoration

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	204	204
Non-Labor	Zero-Based	0	0	0	0	0	0	796	796
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**1,000**	**1,000**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0

Business Purpose:

This budget provides funding to replace customer owned vaults containing SDG&E facilities after inspection.

Physical Description:

This budget provides funding for the replacement or repair of deteriorated customer owned vaults associated with SDG&E facilities. Each vault is inspected through our Corrective Maintenance Program (CMP), and based on the results of these detailed inspections, minor equipment repairs (e.g. lighting, fans) and/or major structural repairs are identified. Good engineering practices and CPUC General Orders dictate the replacement or repairs of these vaults be completed to ensure employee, contractor, and public safety.

Project Justification:

Once the vaults are inspected thoroughly and based on the detailed inspection, minor equipment repairs, replacement of equipment that is no longer serviceable, and/or major structural repairs are performed on the vault.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16257.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	25. VAULT MAINTENANCE
Workpaper Group:	162570 - Vault Restoration

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

NA

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16257.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 25. VAULT MAINTENANCE
Workpaper Group: 162570 - Vault Restoration

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	204	204	0	204	204
Non-Labor	Zero-Based	0	0	0	0	796	796	0	796	796
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**1,000**	**1,000**	**0**	**1,000**	**1,000**
FTE	Zero-Based	0.0	0.0	0.0	0.0	2.0	2.0	0.0	2.0	2.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16257.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 25. VAULT MAINTENANCE
Workpaper Group: 162570 - Vault Restoration

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16257.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 25. VAULT MAINTENANCE
Workpaper Group: 162570 - Vault Restoration

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 162570

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16257.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	25. VAULT MAINTENANCE
Workpaper Group:	162570 - Vault Restoration
Workpaper Detail:	162570.001 - VAULT RESTORATION
In-Service Date:	Not Applicable

Description:

Vault Restoration

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	204	204
Non-Labor	0	796	796
NSE	0	0	0
Total	**0**	**1,000**	**1,000**
FTE	0.0	2.0	2.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
16258A - OIR Worst Circuits

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16258.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 26. OIR Worst Circuits
Workpaper Group: 16258A - OIR Worst Circuits

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	582	582	582
Non-Labor	Zero-Based	0	0	0	0	0	1,920	1,920	1,920
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**2,502**	**2,502**	**2,502**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	5.8	5.8	5.8

Business Purpose:

This budget provides funding to support projects and construction of projects that include modifications to, installation and/or replacement of equipment to improve Reliability on SDG&E's 1% worst circuits as identified in the CPUC Annual Reliability Report. This budget is a result of the CPUC's recent Order Instituting Rulemaking OIR R.14-12-014 – Electric Reliability Reporting, which addresses the top 1% worst circuits at the utility.

Physical Description:

SDG&E is required to determine and complete cost effective remediation projects on worst circuits and to improve the circuits that include any or all of the following; installation of fuses, overhead and underground manual switches, SCADA service restorers, SCADA switches, overhead fault indicators, circuit reconfiguration and circuit reconductoring for improving electric system reliability.

Project Justification:

This budget provides funding to support projects and construction of projects that include modifications to, installation and/or replacement of equipment to improve Reliability on SDG&E's 1% worst circuits as identified in the CPUC Annual Reliability Report. This budget is a result of the CPUC's recent Order Instituting Rulemaking OIR R.14-12-014 – Electric Reliability Reporting, which addresses the top 1% worst circuits at the utility. SDG&E is required to determine and complete cost effective remediation projects on worst circuits and to improve the circuits that include any or all of the following; installation of fuses, overhead and underground manual switches, SCADA service restorers, SCADA switches, overhead fault indicators, circuit reconfiguration and circuit reconductoring for improving electric system reliability. Information regarding the OIR Worst Circuit initiative is found in the capital work papers. See SDG&E-14-CWP at section 16258 – OIR Worst Circuits.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16258.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	26. OIR Worst Circuits
Workpaper Group:	16258A - OIR Worst Circuits

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

NA

Beginning of Workpaper Sub Details for
Workpaper Group 16258A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16258.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 26. OIR Worst Circuits
Workpaper Group: 16258A - OIR Worst Circuits
Workpaper Detail: 16258A.001 - OIR Worst Circuits

In-Service Date: Not Applicable

Description:

New Reliability Reporting OIR Ruling 14-12-014: Relative to SDG&E's top 1% worst circuits. The Ruling states that SDG&E is to provide data to that explains reasons why each circuit made the worst circuit list. If any worst circuit is reported out on any consecutive year "as a repeat", SDG&E is to provide data explaining why, explain how SDG&E is going to mitigate it moving forward (likely Reliability upgrades), and explain how the upgrades will improve Reliability of the Circuit moving forward. This would be incremental Reliability work focused specifically on the 10 worst circuits. SDG&E has presented to the CPUC the Circuits that fall under this category, many have been on the list for consecutive years. We will be required to address them with additional proactive Reliability projects beginning in 2017. There is currently several efforts involving research on how to improve the repeat circuits that fell on the list in attempt to scope the additional work.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	582	582	582
Non-Labor	1,920	1,920	1,920
NSE	0	0	0
Total	**2,502**	**2,502**	**2,502**
FTE	5.8	5.8	5.8

Note: Totals may include rounding differences.

Beginning of Workpaper Group
16260A - MORRO HILL SUBSTATION REBUILD

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16260.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 27. MORRO HILL SUBSTATION REBUILD
Workpaper Group: 16260A - MORRO HILL SUBSTATION REBUILD

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	12	192	986
Non-Labor	Zero-Based	0	0	0	0	0	0	926	2,765
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**12**	**1,118**	**3,751**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.1	1.9	9.9

Business Purpose:

Morro Hill Substation was originally built in 1977 as a short term substation utilizing wood structures and minimal equipment. The need for the substation still exists and it needs to be completely rebuilt to eliminate the wood pole structures and replace aging equipment and infrastructure

Physical Description:

The objectives and benfits of the rebuild include : • Replaces existing and obsolete infrastructure.
• Rebuilds to new standards, including the addition of transmission protective breakers for the transformers and the addition of bus ties – all of which increase reliability and operations.
• Rebuilds equipment to new seismic standards
• Rebuilds to new security standards.
• Improves aesthetics of existing substation.
• Increases ultimate distribution and transmission capacity.
• Increases available distribution tie capacity between neighboring substations which allows for more operating flexibility and shorter outage times.
• Reduces maintenance on substation equipment.
• Supports SCADA (Supervisory control and Data Acquisition) addition resulting in improved outage times and increase operating flexibility.
• Supports the addition of monitoring specific substation equipment which results in improved maintenance and operations.
• Increases safety (both public and employee) due to design spacing, fire walls, and new equipment.

Project Justification:

Aging infrastructure.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16260.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	27. MORRO HILL SUBSTATION REBUILD
Workpaper Group:	16260A - MORRO HILL SUBSTATION REBUILD

Forecast Methodology:

Labor - Zero-Based

ZERO Based The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

ZERO Based The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 16260A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16260.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	27. MORRO HILL SUBSTATION REBUILD
Workpaper Group:	16260A - MORRO HILL SUBSTATION REBUILD
Workpaper Detail:	16260A.001 - RAMP - Incremental MORRO HILL SUBSTATION REBUILD- Post Filing
In-Service Date:	12/31/2019

Description:

This budget provides funding to replace aging infrastructure at the existing Morro Hill Substation. Morro Hill Substation was originally built in 1977 as a short-term substation solution utilizing wood structures and minimal equipment. The need for the substation still exists and it needs to be completely rebuilt to eliminate the wood pole structures and replace aging equipment and infrastructure.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	12	192	986
Non-Labor	0	926	2,765
NSE	0	0	0
Total	**12**	**1,118**	**3,751**
FTE	0.1	1.9	9.9

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16260.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	27. MORRO HILL SUBSTATION REBUILD
Workpaper Group:	16260A - MORRO HILL SUBSTATION REBUILD
Workpaper Detail:	16260A.001 - RAMP - Incremental MORRO HILL SUBSTATION REBUILD- Post Filing

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Morro Hill Sub Rebuild

Program Description: Replaces exisitn and obsolete infrstructure

Risk/Mitigation:

Risk: Infrastracuture failure

Mitigation: Replacement

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
172530 - GRID ANALYTICS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17253.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 28. Electric Distribution Grid Analytics
Workpaper Group: 172530 - GRID ANALYTICS

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	1,100	1,100
Non-Labor	Zero-Based	0	0	0	0	0	0	2,200	2,200
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**3,300**	**3,300**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	11.0	11.0

Business Purpose:

The project provides quicker decisions for outage and storm management. This could ultimately reduce SAIDI and SAIFI impacts. Enhancing the reliability and safe operation of the distribution system.

Physical Description:

Consolidate data from Service Now, SCADA (direct feed preferred), NMS (as switched), Customer (AMI), EDW, GIS (as built), Click (work order); SAP - financials, PM; Cascade, DERMS, and PMU. Build dashboards and reports - real time outages (electric and communications), alarms, trends, predictive, calculate SAIDI, SAIFI, correlation with asset history and failure

Project Justification:

Project would consolidate data sources from different functional areas allowing operations to create operational reports and dashboard for reliability, storm, and day to day management. These applications would provide data to management for decision making.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17253.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	28. Electric Distribution Grid Analytics
Workpaper Group:	172530 - GRID ANALYTICS

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

NA

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17253.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 28. Electric Distribution Grid Analytics
Workpaper Group: 172530 - GRID ANALYTICS

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	1,100	1,100	0	1,100	1,100
Non-Labor	Zero-Based	0	0	0	0	2,200	2,200	0	2,200	2,200
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**3,300**	**3,300**	**0**	**3,300**	**3,300**
FTE	Zero-Based	0.0	0.0	0.0	0.0	11.0	11.0	0.0	11.0	11.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17253.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 28. Electric Distribution Grid Analytics
Workpaper Group: 172530 - GRID ANALYTICS

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17253.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 28. Electric Distribution Grid Analytics
Workpaper Group: 172530 - GRID ANALYTICS

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 172530

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17253.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 28. Electric Distribution Grid Analytics
Workpaper Group: 172530 - GRID ANALYTICS
Workpaper Detail: 172530.001 - Electric Distribution Grid Analytics

In-Service Date: 04/30/2019

Description:

Project would consolidate data sources from different functional areas allowing operations to create operational reports and dashboard for reliability, storm, and day to day management. These applications would provide data to management for decision making.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	1,100	1,100
Non-Labor	0	2,200	2,200
NSE	0	0	0
Total	**0**	**3,300**	**3,300**
FTE	0.0	11.0	11.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 93240.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 29. Distribution circuit Reliability Construction
Workpaper Group: 932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP

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	900	530	672	397	901	1,064	1,136	1,189
Non-Labor	Zero-Based	4,471	1,136	1,816	3,435	2,883	1,736	1,854	3,760
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**5,371**	**1,665**	**2,487**	**3,832**	**3,784**	**2,800**	**2,990**	**4,949**
FTE	Zero-Based	6.7	4.7	5.4	3.2	6.2	10.6	11.4	11.9

Business Purpose:

This project provides funds for the addition of equipment necessary to improve service reliability of electric customers and maintain corporate reliability standards..

Physical Description:

The electric service reliability will deteriorate in the absence of comprehensive remedial solutions offered by these projects, also, electric reliability performance is negativley impacted by system deficiencies and an aging infrastructure. The 93240 budget funds projects that mitigate existing electric system deficiencies, projects for system performance improvements as follows General Relaibility, Scada Initiatives and the Community Fire Safety Program.

Project Justification:

By not performing this work, it may have a negative impact on PBR

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	93240.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	29. Distribution circuit Reliability Construction
Workpaper Group:	932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

NA

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 93240.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 29. Distribution circuit Reliability Construction
Workpaper Group: 932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP

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	1,064	1,136	1,189	0	0	0	1,064	1,136	1,189
Non-Labor	Zero-Based	1,736	1,854	3,760	0	0	0	1,736	1,854	3,760
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**2,800**	**2,990**	**4,949**	**0**	**0**	**0**	**2,800**	**2,990**	**4,949**
FTE	Zero-Based	10.6	11.4	11.9	0.0	0.0	0.0	10.6	11.4	11.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 93240.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 29. Distribution circuit Reliability Construction
Workpaper Group: 932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	709	427	558	339	773
Non-Labor	4,031	1,061	1,748	3,388	2,883
NSE	0	0	0	0	0
Total	**4,740**	**1,488**	**2,306**	**3,727**	**3,656**
FTE	5.8	4.0	4.6	2.7	5.2
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	709	427	558	339	773
Non-Labor	4,031	1,061	1,748	3,388	2,883
NSE	0	0	0	0	0
Total	**4,740**	**1,488**	**2,306**	**3,727**	**3,656**
FTE	5.8	4.0	4.6	2.7	5.2
Vacation & Sick (Nominal $)					
Labor	103	68	89	52	128
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**103**	**68**	**89**	**52**	**128**
FTE	0.9	0.7	0.8	0.5	1.0
Escalation to 2016$					
Labor	88	35	25	5	0
Non-Labor	439	75	67	47	0
NSE	0	0	0	0	0
Total	**528**	**110**	**92**	**52**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	900	530	672	397	901
Non-Labor	4,471	1,136	1,816	3,435	2,883
NSE	0	0	0	0	0
Total	**5,371**	**1,665**	**2,487**	**3,832**	**3,784**
FTE	6.7	4.7	5.4	3.2	6.2

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 93240.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 29. Distribution circuit Reliability Construction
Workpaper Group: 932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP

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 932400

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	93240.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	29. Distribution circuit Reliability Construction
Workpaper Group:	932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP
Workpaper Detail:	932400.001 - RAMP - Incremental - Distribution circuit Reliability Construction
In-Service Date:	Not Applicable

Description:

The electric service reliability will deteriorate in the absence of comprehensive remedial solutions offered by these projects, also, electric reliability performance is negativley impacted by system deficiencies and an aging infrastructure. The 93240 budget funds projects that mitigate existing electric system deficiencies, projects for system performance improvements as follows General Relaibility, Scada Initiatives and the Community Fire Safety Program.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	1,064	1,136	1,189
Non-Labor	1,736	1,854	1,941
NSE	0	0	0
Total	**2,800**	**2,990**	**3,130**
FTE	10.6	11.4	11.9

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	93240.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	29. Distribution circuit Reliability Construction
Workpaper Group:	932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP
Workpaper Detail:	932400.001 - RAMP - Incremental - Distribution circuit Reliability Construction

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Proactively replace bridged cutout switches with SCADA gang operated or disconnect switches

Program Description: Bridged cutout switches may cause forced outages due to improper seating (unseating). These switches may also prolong outages, create safety risks for field personnel, and become fire ignition hazards when operated in the field. Due to their single phase design, isolated single phase failures may cause damage to the electric system due to the resulting ferroresonance.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Expand and Maintain Distribution Advanced SCADA infrastructure

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	4,244	4,244	4,244
High	5,517	5,517	5,517

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: N

Historical Embedded Cost Estimates ($000)

Embedded Costs: 3783

Explanation: This item is all related to RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 93240.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 29. Distribution circuit Reliability Construction
Workpaper Group: 932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP
Workpaper Detail: 932400.002 - RAMP - Base Switch Program

In-Service Date: Not Applicable

Description:

Switch Program add

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	0	0	1,819
NSE	0	0	0
Total	**0**	**0**	**1,819**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	93240.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	29. Distribution circuit Reliability Construction
Workpaper Group:	932400 - DISTRIBUTION CIRCUIT RELIABILITY CONSTRUCTION - RAMP
Workpaper Detail:	932400.002 - RAMP - Base Switch Program

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Distribution circuit

Program Description: Equipment to Improve Serice Reliability and maintain reliability standards

Risk/Mitigation:

Risk: Negative impact on PBR

Mitigation: Replace with new Equipment

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: .

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
992820 - REPLACE OBSOLETE SUBSTATION EQUIPMENT - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 99282.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 30. REPLACE OBSOLETE SUBSTATION EQUIPMENT
Workpaper Group: 992820 - REPLACE OBSOLETE SUBSTATION EQUIPMENT - RAMP

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	692	62	138	276	147	263	1,973	2,423
Non-Labor	5-YR Average	4,556	340	154	355	1,243	881	6,171	12,721
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**5,248**	**402**	**293**	**631**	**1,389**	**1,144**	**8,144**	**15,144**
FTE	5-YR Average	5.3	0.5	1.2	2.2	1.1	2.1	19.8	24.2

Business Purpose:

This project will improve safety and reliability related to the replacement of obsolete and problematic substation equipment. This project will focus primarily on distribution substation bank transformers and circuit breaker replacements.

Physical Description:

The Substation Equipment Assessment Team will develop alternatives to replace or remove obsolete and problematic equipment. A condition assessment process and evaluation criteria have been created using probability and risk analysis, financial impacts and present value analysis to justify projects. Equipment that is truly obsolete such as equipment that cannot be maintained (no spare parts available), or that which poses a safety risk will be replaced. Each year the average age of all substation equipment increases, with the oldest transformer currently 80+ years old. The ranking of substation equipment is an ongoing process and involves identifying equipment that presents a significant risk to the system. Based on the cost and availability of raw materials from the manufacturer, and global demand, lead times for major substation equipment has increased to 6 months for breakers, to a 1.5 years for transformers.

Project Justification:

Substations are essential to the operation of the electric system and must be kept in reliabile condition as the consequences of a failure are extreme. The sum of all distribution substations contain a total of approximately 300 transformers with an average age of approximately 13 years and 1500 circuit breakers with an average age of 26 years. The estimated cost of replacing 3% or 9 bank transformers and 5% or 75 distribution circuit breakers is $26M which will provide a sufficient rate of funding to replace the highest priority obsolete and problematic equipment. A cost benefit analysis will be evaluated on a project-by-project basis. Proactive planning is required for the replacement of equipment that has exhausted its useful life.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	99282.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	30. REPLACE OBSOLETE SUBSTATION EQUIPMENT
Workpaper Group:	992820 - REPLACE OBSOLETE SUBSTATION EQUIPMENT - RAMP

Forecast Methodology:

Labor - 5-YR Average

The forecast is based on a 5-year average with adjustments made based on the forecasted amount of work.

Non-Labor - 5-YR Average

The forecast is based on a 5-year average with adjustments made based on the forecasted amount of work.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 99282.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 30. REPLACE OBSOLETE SUBSTATION EQUIPMENT
Workpaper Group: 992820 - REPLACE OBSOLETE SUBSTATION EQUIPMENT - RAMP

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	263	263	263	0	1,710	2,160	263	1,973	2,423
Non-Labor	5-YR Average	1,329	1,329	1,329	-448	4,842	11,392	881	6,171	12,721
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**1,592**	**1,592**	**1,592**	**-448**	**6,552**	**13,552**	**1,144**	**8,144**	**15,144**
FTE	5-YR Average	2.1	2.1	2.1	0.0	17.7	22.1	2.1	19.8	24.2

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	0	-448	0	-448	0.0	TEELLIOT20161201102420090
Explanation:	The forecast is based on a 5-year average with adjustments made based on the forecasted amount of work.						
2017 Total		0	-448	0	-448	0.0	
2018	Other	1,710	4,842	0	6,552	17.7	TEELLIOT20161201102537220
Explanation:	The forecast is based on a 5-year average with adjustments made based on the forecasted amount of work.						
2018 Total		1,710	4,842	0	6,552	17.7	
2019	Other	2,160	11,392	0	13,552	22.1	TEELLIOT20161201102556517
Explanation:	The forecast is based on a 5-year average with adjustments made based on the forecasted amount of work.						
2019 Total		2,160	11,392	0	13,552	22.1	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 99282.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 30. REPLACE OBSOLETE SUBSTATION EQUIPMENT
Workpaper Group: 992820 - REPLACE OBSOLETE SUBSTATION EQUIPMENT - RAMP

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	545	50	115	236	126
Non-Labor	4,108	318	148	350	1,243
NSE	0	0	0	0	0
Total	**4,653**	**367**	**263**	**586**	**1,368**
FTE	4.6	0.4	1.0	1.9	0.9
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	545	50	115	236	126
Non-Labor	4,108	318	148	350	1,243
NSE	0	0	0	0	0
Total	**4,653**	**367**	**263**	**586**	**1,368**
FTE	4.6	0.4	1.0	1.9	0.9
Vacation & Sick (Nominal $)					
Labor	79	8	18	36	21
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**79**	**8**	**18**	**36**	**21**
FTE	0.7	0.1	0.2	0.3	0.2
Escalation to 2016$					
Labor	68	4	5	4	0
Non-Labor	448	22	6	5	0
NSE	0	0	0	0	0
Total	**516**	**26**	**11**	**9**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	692	62	138	276	147
Non-Labor	4,556	340	154	355	1,243
NSE	0	0	0	0	0
Total	**5,248**	**402**	**293**	**631**	**1,389**
FTE	5.3	0.5	1.2	2.2	1.1

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 99282.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 30. REPLACE OBSOLETE SUBSTATION EQUIPMENT
Workpaper Group: 992820 - REPLACE OBSOLETE SUBSTATION EQUIPMENT - RAMP

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 992820

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	99282.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	30. REPLACE OBSOLETE SUBSTATION EQUIPMENT
Workpaper Group:	992820 - REPLACE OBSOLETE SUBSTATION EQUIPMENT - RAMP
Workpaper Detail:	992820.001 - RAMP - Incremental - REPLACE OBSOLETE SUBSTATION EQUIPMENT
In-Service Date:	Not Applicable

Description:

The Substation Equipment Assessment Team will develop alternatives to replace or remove obsolete and problematic equipment. A condition assessment process and evaluation criteria have been created using probability and risk analysis, financial impacts and present value analysis to justify projects. Equipment that is truly obsolete such as equipment that cannot be maintained (no spare parts available), or that which poses a safety risk will be replaced. Each year the average age of all substation equipment increases, with the oldest transformer currently 80+ years old. The ranking of substation equipment is an ongoing process and involves identifying equipment that presents a significant risk to the system. Based on the cost and availability of raw materials from the manufacturer, and global demand, lead times for major substation equipment has increased to 6 months for breakers, to a 1.5 years for transformers.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	263	1,973	2,423
Non-Labor	881	6,171	12,721
NSE	0	0	0
Total	**1,144**	**8,144**	**15,144**
FTE	2.1	19.8	24.2

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	99282.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	30. REPLACE OBSOLETE SUBSTATION EQUIPMENT
Workpaper Group:	992820 - REPLACE OBSOLETE SUBSTATION EQUIPMENT - RAMP
Workpaper Detail:	992820.001 - RAMP - Incremental - REPLACE OBSOLETE SUBSTATION EQUIPMENT

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Distribution - SEA Team-guided design and construction program. Includes obsolete equipment replace

Program Description: Replacement of severely aged substation infrastructure will continue based on operational signficance and SDG&E reliability standards.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Substation rebuild/replacements based on operational significance and SDG&E reliability standards

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	8,000	8,000	8,000
High	10,400	10,400	10,400

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 1390

Explanation: This item is all related to RAMP

Beginning of Workpaper Group
122430 - PHASOR MEASUREMENT UNITS (DISTRIBUTION)

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 31. PHASOR MEASUREMENT UNITS (DISTRIBUTION)
Workpaper Group: 122430 - PHASOR MEASUREMENT UNITS (DISTRIBUTION)

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	3-YR Average	101	64	243	52	66	120	120	120
Non-Labor	3-YR Average	879	1,638	1,898	3,097	694	1,896	1,896	1,896
NSE	3-YR Average	0	0	0	0	0	0	0	0
Total		**980**	**1,702**	**2,141**	**3,149**	**759**	**2,016**	**2,016**	**2,016**
FTE	3-YR Average	0.8	0.6	2.4	0.3	0.5	1.1	1.1	1.1

Business Purpose:

Phasor measurement technologies will help mitigate the intermittency issues assocaited with distributed renewables by employing high-speed, time-synchronized measuremnt devices installed in substations and at key points on the distribution sytem. Using time stamped, digitized waveform measurements, SDG&E can analyze the output of PV systems, identify changes in PV output and enable the dispatch of energy storage devices to counteract the effecst of PV output fluctuation.

Physical Description:

Phasor measurement technologies are needed for understanding potential problems with the grid and are therefore a key compnent of a stable, self-healing grid. As the penetration of renewables increases, there will be increased voltage and phase-angle fluctuations at various points on the system. PMU data can equip system operators with better real-time information about actual operatin margins so that they can better understand and manage risk of operating closer to the operating limits. Specifically, some of the funcitonality enabled by PMU technologies includes monitoring and visualization for improved control room operations, wide-area control and protection and power system restoration.

Project Justification:

Installation of phase measurement units (PMU) on the electric distribution system are expected to improve reliability by emplyoing high speed, time synchronized measurement devices. These devices will be utilized in conjuction with energy storage devices to create a closed loop control system to mitigate the impact of intermittent renewables.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12243.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	31. PHASOR MEASUREMENT UNITS (DISTRIBUTION)
Workpaper Group:	122430 - PHASOR MEASUREMENT UNITS (DISTRIBUTION)

Forecast Methodology:

Labor - 3-YR Average

The forecast methodology is a 3 Year Average

Non-Labor - 3-YR Average

The forecast methodology is a 3 Year Average

NSE - 3-YR Average

NA

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 31. PHASOR MEASUREMENT UNITS (DISTRIBUTION)
Workpaper Group: 122430 - PHASOR MEASUREMENT UNITS (DISTRIBUTION)

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	3-YR Average	120	120	120	0	0	0	120	120	120
Non-Labor	3-YR Average	1,896	1,896	1,896	0	0	0	1,896	1,896	1,896
NSE	3-YR Average	0	0	0	0	0	0	0	0	0
Total		**2,016**	**2,016**	**2,016**	**0**	**0**	**0**	**2,016**	**2,016**	**2,016**
FTE	3-YR Average	1.1	1.1	1.1	0.0	0.0	0.0	1.1	1.1	1.1

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 31. PHASOR MEASUREMENT UNITS (DISTRIBUTION)
Workpaper Group: 122430 - PHASOR MEASUREMENT UNITS (DISTRIBUTION)

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	79	52	201	45	56
Non-Labor	793	1,530	1,828	3,054	694
NSE	0	0	0	0	0
Total	**872**	**1,582**	**2,030**	**3,099**	**750**
FTE	0.7	0.5	2.0	0.3	0.4
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	79	52	201	45	56
Non-Labor	793	1,530	1,828	3,054	694
NSE	0	0	0	0	0
Total	**872**	**1,582**	**2,030**	**3,099**	**750**
FTE	0.7	0.5	2.0	0.3	0.4
Vacation & Sick (Nominal $)					
Labor	11	8	32	7	9
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**11**	**8**	**32**	**7**	**9**
FTE	0.1	0.1	0.4	0.0	0.1
Escalation to 2016$					
Labor	10	4	9	1	0
Non-Labor	86	108	70	42	0
NSE	0	0	0	0	0
Total	**96**	**112**	**79**	**43**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	101	64	243	52	66
Non-Labor	879	1,638	1,898	3,097	694
NSE	0	0	0	0	0
Total	**980**	**1,702**	**2,141**	**3,149**	**759**
FTE	0.8	0.6	2.4	0.3	0.5

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 31. PHASOR MEASUREMENT UNITS (DISTRIBUTION)
Workpaper Group: 122430 - PHASOR MEASUREMENT UNITS (DISTRIBUTION)

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 122430

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 31. PHASOR MEASUREMENT UNITS (DISTRIBUTION)
Workpaper Group: 122430 - PHASOR MEASUREMENT UNITS (DISTRIBUTION)
Workpaper Detail: 122430.001 - RAMP - Base - PHASOR MEASUREMENT UNITS (DISTRIBUTION)

In-Service Date: Not Applicable

Description:

Phasor measurement units (PMU) throughout the distribution system to employ high-speed time-synchronized measurement devices.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	120	120	120
Non-Labor	1,896	1,896	1,896
NSE	0	0	0
Total	**2,016**	**2,016**	**2,016**
FTE	1.1	1.1	1.1

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12243.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	31. PHASOR MEASUREMENT UNITS (DISTRIBUTION)
Workpaper Group:	122430 - PHASOR MEASUREMENT UNITS (DISTRIBUTION)
Workpaper Detail:	122430.001 - RAMP - Base - PHASOR MEASUREMENT UNITS (DISTRIBUTION)

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: Phasor Measurement Units (Distribution)

Program Description: Phasor Measruement units (PMU) throughout the distribution system to employ high-speed time-synchronized measurement devices

Risk/Mitigation:

Risk: SDG&E-1

Mitigation: Design and Engineering Approaches

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Average

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 760

Explanation: This is all RAMP related

Beginning of Workpaper Group
122470 - SMART ISOLATION & RECLOSING

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12247.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 32. SMART ISOLATION & RECLOSING
Workpaper Group: 122470 - SMART ISOLATION & RECLOSING

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	216	244	162	21	0	298	298	298
Non-Labor	Zero-Based	1,442	962	-84	-283	0	1,058	1,058	1,058
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**1,658**	**1,206**	**78**	**-262**	**0**	**1,356**	**1,356**	**1,356**
FTE	Zero-Based	1.7	2.2	1.5	0.1	0.0	2.9	2.9	2.9

Business Purpose:

This project will improve system reliability and provide faster power restoration for utility customers.

Physical Description:

This project applies off-the-shelf technology to limit the discharge energy on the distribution sytstem. The sensor-equipped devices reduce energy applied to the system when reclosing into a faulted section of a circuit for testing. Installation of these devices will consist of specific locations throughout the distribution system.

Project Justification:

Application of off-the-shelf pulse closing technology at additional points on the system. SDG&E has already applied this technology which limits the amount of energy SDG&E re-closes back into faulted circuits, improving public safety.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12247.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	32. SMART ISOLATION & RECLOSING
Workpaper Group:	122470 - SMART ISOLATION & RECLOSING

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

NA

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12247.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 32. SMART ISOLATION & RECLOSING
Workpaper Group: 122470 - SMART ISOLATION & RECLOSING

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	298	298	298	0	0	0	298	298	298
Non-Labor	Zero-Based	1,058	1,058	1,058	0	0	0	1,058	1,058	1,058
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**1,356**	**1,356**	**1,356**	**0**	**0**	**0**	**1,356**	**1,356**	**1,356**
FTE	Zero-Based	2.9	2.9	2.9	0.0	0.0	0.0	2.9	2.9	2.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12247.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 32. SMART ISOLATION & RECLOSING
Workpaper Group: 122470 - SMART ISOLATION & RECLOSING

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	170	197	135	18	0
Non-Labor	1,300	898	-81	-279	0
NSE	0	0	0	0	0
Total	**1,470**	**1,095**	**53**	**-261**	**0**
FTE	1.5	1.9	1.3	0.1	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	170	197	135	18	0
Non-Labor	1,300	898	-81	-279	0
NSE	0	0	0	0	0
Total	**1,470**	**1,095**	**53**	**-261**	**0**
FTE	1.5	1.9	1.3	0.1	0.0
Vacation & Sick (Nominal $)					
Labor	25	31	22	3	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**25**	**31**	**22**	**3**	**0**
FTE	0.2	0.3	0.2	0.0	0.0
Escalation to 2016$					
Labor	21	16	6	0	0
Non-Labor	142	63	-3	-4	0
NSE	0	0	0	0	0
Total	**163**	**79**	**3**	**-4**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	216	244	162	21	0
Non-Labor	1,442	962	-84	-283	0
NSE	0	0	0	0	0
Total	**1,658**	**1,206**	**78**	**-262**	**0**
FTE	1.7	2.2	1.5	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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12247.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 32. SMART ISOLATION & RECLOSING
Workpaper Group: 122470 - SMART ISOLATION & RECLOSING

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 122470

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12247.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	32. SMART ISOLATION & RECLOSING
Workpaper Group:	122470 - SMART ISOLATION & RECLOSING
Workpaper Detail:	122470.001 - RAMP - Base - SMART ISOLATION & RECLOSIN
In-Service Date:	Not Applicable

Description:

The sensor-equipped devices reduce energy applied to the system when reclosing into a faulted section of a circuit for testing

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	298	298	298
Non-Labor	1,058	1,058	1,058
NSE	0	0	0
Total	**1,356**	**1,356**	**1,356**
FTE	2.9	2.9	2.9

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12247.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	32. SMART ISOLATION & RECLOSING
Workpaper Group:	122470 - SMART ISOLATION & RECLOSING
Workpaper Detail:	122470.001 - RAMP - Base - SMART ISOLATION & RECLOSIN

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: Smart Isolation & Reclosing

Program Description: This project applies off-the-shelf limited discharge energy technology on the distribution sytstem. Sensor-equipped devices reduce the energy let-through when reclosing into a distribution line when switched off due to a fault.

Risk/Mitigation:

Risk: SDG&E-1

Mitigation: Monitoring and Detection

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: This Item is all related to RAMP

Beginning of Workpaper Group
132430 - New Vine 69/12kV Substation

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 33. NEW VINE 69/12KV SUBSTATION
Workpaper Group: 132430 - New Vine 69/12kV Substation

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	13	37	32	246	594	0	0
Non-Labor	Zero-Based	0	99	598	1,191	4,591	10,348	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**112**	**634**	**1,224**	**4,837**	**10,942**	**0**	**0**
FTE	Zero-Based	0.0	0.1	0.4	0.4	2.6	5.9	0.0	0.0

Business Purpose:

To meet electric distribution load growth and reliability in the downtown San Diego area.

Physical Description:

Build a new 69/12kV substation near the downtown area to serve the downtown and outlying areas in San Diego. Add tie capacity and reliability to existing substations in the area.

Project Justification:

Forecasted load growth in the San diego downtown area requires capacity to be built and reliability of existing infrastructure to be improved. New Vine Substation will increase capacity and improve the reliability of neighboring substations.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13243.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	33. NEW VINE 69/12KV SUBSTATION
Workpaper Group:	132430 - New Vine 69/12kV Substation

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 33. NEW VINE 69/12KV SUBSTATION
Workpaper Group: 132430 - New Vine 69/12kV Substation

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	594	0	0	0	0	0	594	0	0
Non-Labor	Zero-Based	10,348	0	0	0	0	0	10,348	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**10,942**	**0**	**0**	**0**	**0**	**0**	**10,942**	**0**	**0**
FTE	Zero-Based	5.9	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 33. NEW VINE 69/12KV SUBSTATION
Workpaper Group: 132430 - New Vine 69/12kV Substation

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	10	30	28	211
Non-Labor	0	93	575	1,175	4,591
NSE	0	0	0	0	0
Total	**0**	**103**	**606**	**1,203**	**4,802**
FTE	0.0	0.1	0.3	0.3	2.2
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	0	10	30	28	211
Non-Labor	0	93	575	1,175	4,591
NSE	0	0	0	0	0
Total	**0**	**103**	**606**	**1,203**	**4,802**
FTE	0.0	0.1	0.3	0.3	2.2
Vacation & Sick (Nominal $)					
Labor	0	2	5	4	35
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**2**	**5**	**4**	**35**
FTE	0.0	0.0	0.1	0.1	0.4
Escalation to 2016$					
Labor	0	1	1	0	0
Non-Labor	0	7	22	16	0
NSE	0	0	0	0	0
Total	**0**	**7**	**23**	**17**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	13	37	32	246
Non-Labor	0	99	598	1,191	4,591
NSE	0	0	0	0	0
Total	**0**	**112**	**634**	**1,224**	**4,837**
FTE	0.0	0.1	0.4	0.4	2.6

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13243.0
Category: H. RELIABILITY/IMPROVEMENTS
Category-Sub: 33. NEW VINE 69/12KV SUBSTATION
Workpaper Group: 132430 - New Vine 69/12kV Substation

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 132430

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13243.0
Category:	H. RELIABILITY/IMPROVEMENTS
Category-Sub:	33. NEW VINE 69/12KV SUBSTATION
Workpaper Group:	132430 - New Vine 69/12kV Substation
Workpaper Detail:	132430.001 - VINE 69/12KV SUBSTATION
In-Service Date:	09/30/2017

Description:

Build a new 69/12kV substation near the downtown area to serve the downtown and outlying areas in San Diego. Add tie capacity and reliability to existing substations in the area.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	594	0	0
Non-Labor	10,348	0	0
NSE	0	0	0
Total	**10,942**	**0**	**0**
FTE	5.9	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: I. SAFETY & RISK MANAGEMENT
Workpaper: VARIOUS

Summary for Category: I. SAFETY & RISK MANAGEMENT

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	3,093	9,538	19,275	28,318
Non-Labor	46,720	74,209	94,222	156,015
NSE	0	0	0	0
Total	**49,813**	**83,747**	**113,497**	**184,333**
FTE	24.6	95.2	192.6	283.1
132470 Distribution Circuit Reliability				
Labor	2,915	4,594	4,594	4,594
Non-Labor	44,368	53,186	53,186	53,186
NSE	0	0	0	0
Total	**47,283**	**57,780**	**57,780**	**57,780**
FTE	22.9	45.9	45.9	45.9
172490 TEE MODERNIZATION PROGRAM				
Labor	0	566	2,264	3,396
Non-Labor	0	384	1,556	2,334
NSE	0	0	0	0
Total	**0**	**950**	**3,820**	**5,730**
FTE	0.0	5.7	22.6	34.0
17254A Accelerated Pole Loading				
Labor	0	0	370	560
Non-Labor	0	270	4,212	39,870
NSE	0	0	0	0
Total	**0**	**270**	**4,582**	**40,430**
FTE	0.0	0.0	3.7	5.6
142490 SF6 SWITCH REPLACEMENT				
Labor	35	722	2,888	2,888
Non-Labor	425	2,787	11,200	11,200
NSE	0	0	0	0
Total	**460**	**3,509**	**14,088**	**14,088**
FTE	0.2	7.2	28.8	28.8
152460 RANCHO SANTA FE SUB FIRE HARDENING				
Labor	34	1,344	635	0
Non-Labor	347	1,800	2,400	0
NSE	0	0	0	0
Total	**381**	**3,144**	**3,035**	**0**
FTE	0.4	13.4	6.4	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: I. SAFETY & RISK MANAGEMENT
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
152570 GOOGLE FIBER PROJECT (ED)				
Labor	0	0	1,656	1,656
Non-Labor	21	0	3,364	3,364
NSE	0	0	0	0
Total	**21**	**0**	**5,020**	**5,020**
FTE	0.0	0.0	16.6	16.6
152590 FIRE THREAT ZONE ADV PROTECT & SCADA UPG				
Labor	109	623	623	623
Non-Labor	1,559	714	714	714
NSE	0	0	0	0
Total	**1,668**	**1,337**	**1,337**	**1,337**
FTE	1.1	6.2	6.2	6.2
162520 Electric Integrity Ramp				
Labor	0	197	4,001	12,182
Non-Labor	0	591	10,857	40,224
NSE	0	0	0	0
Total	**0**	**788**	**14,858**	**52,406**
FTE	0.0	1.9	40.0	121.8
162550 RTU Modernization				
Labor	0	1,492	2,244	925
Non-Labor	0	4,477	6,733	2,775
NSE	0	0	0	0
Total	**0**	**5,969**	**8,977**	**3,700**
FTE	0.0	14.9	22.4	9.3
162590 NCW: New Bank 32				
Labor	0	0	0	1,494
Non-Labor	0	0	0	2,348
NSE	0	0	0	0
Total	**0**	**0**	**0**	**3,842**
FTE	0.0	0.0	0.0	14.9
172420 TWIN ENGINE HELICOPTER				
Labor	0	0	0	0
Non-Labor	0	10,000	0	0
NSE	0	0	0	0
Total	**0**	**10,000**	**0**	**0**
FTE	0.0	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
132470 - Distribution Circuit Reliability

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13247.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 1. FiRM
Workpaper Group: 132470 - Distribution Circuit Reliability

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	199	436	1,020	2,915	4,594	4,594	4,594
Non-Labor	Zero-Based	0	3,252	8,440	7,870	44,368	53,186	53,186	53,186
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**3,451**	**8,876**	**8,890**	**47,282**	**57,780**	**57,780**	**57,780**
FTE	Zero-Based	0.0	1.8	3.4	8.9	22.9	45.9	45.9	45.9

Business Purpose:

Wildfire is a significant risk for San Diego County and South Orange County, as witnessed in 2003, 2007, and in 2014. Not only is wildfire a risk to the public, it also threatens the reliability of the electric system. This initiative will address aged conductor, aged splices, overloaded poles, as well as other conditions that are known to be a risk in the fire-prone areas. The combination of these fire mitigation methods effectively and efficiently reduces the risk of fire initiation and propagation while prioritizing the highest risk assets for strategic targeting by the FiRM project. When replacing these high-risk assets, poles, conductor, and other hardware are designed and constructed in accordance with current regulatory requirements as well as known local weather conditions for increased preparedness. In all, the FiRM project provides substantive fire risk reduction for SDG&E and our customers.

Physical Description:

The projects within this budget are scoped on a circuit-by-circuit basis and considers other risk factors besides hardening sections on the circuit. In addition to fire-hardening by replacing antiquated conductor and poles, other targeted fire risk mitigation methods on the circuit are also employed. These include removal of known high risk equipment (e.g. hot line clamps directly on primary line and multiple splices on a single span), long span elimination, upgrading fixed capacitors for remote SCADA monitoring and advanced technology implementation (namely, falling conductor protection). Falling Conductor Protection (FCP) utilizes phasor measurement units (PMUs), strategically placed on circuits to detect instantaneous voltage differences caused from a broken conductor and acts to de-energize the conductor while falling to the ground. While this fire mitigation method does not reduce the likelihood of wire-downs, it does reduce the likelihood of an energized wire-down and subsequently reduces fire risk. This method of fire mitigation is used as a supplement to conductor and pole replacement risk mitigation.

Project Justification:

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13247.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	1. FiRM
Workpaper Group:	132470 - Distribution Circuit Reliability

Of the high fire risk events, contact of ignitable fuel with energized conductors (wire-down) comprises one of the highest fire risk events. Mitigation of an energized wire-down, or an electrified conductor contacting a non-approved surface, is paramount to the FiRM project. Based on historical wire-down data, approximately 75% of the wire-downs in SDG&E service territory occur on spans with #4 or #6 copper conductors. Furthermore, this type of conductor, relative to other common conductors utilized in SDG&E service territory, possesses a higher failure rate. As such, the FiRM project almost exclusively targets this aged, small copper conductor and wood poles for replacement with more robust conductor and steel poles.

Due to the large quantity of small copper conductor (approximately half of the distribution system) in SDG&E service territory, a prioritization method is employed to quantify the relative risk of asset failure resulting in ignition and propagation of fire. In tandem with historical wire-down data, a sophisticated Wildfire Risk Reduction Model (WRRM) assesses the relative risk of fire for various assets. WRRM is a probabilistic computer model that can perform nearly 70 million fire behavior simulations. It conducts a risk assessment at every pole and span, using that asset's characteristics, and geographic meteorological and environmental conditions to calculate risk metrics. WRRM utilizes the following as a quantitative approach to risk management:

- Failure rates (before in comparison to after hardening);
- Probability of ignition;
- Environmental conditions;
- Fire behavior;
- Consequence; and
- Cost of hardening project.

FiRM employs WRRM and historical wire-down data to help inform its risk-related decision-making and prioritize projects, and these ranking processes will continue to evolve and be refined by updating failure rate parameters and other risk attributes. All of the fire hardening performed within FiRM shall be wi

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13247.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	1. FiRM
Workpaper Group:	132470 - Distribution Circuit Reliability

Forecast Methodology:

Labor - Zero-Based

The forecast method used for Fire Risk Mitigation (FIRM) is zero-based. The forecast is based on detailed cost estimates that are developed based on the specific scope of work for the project. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used for Fire Risk Mitigation (FIRM) is zero-based. The forecast is based on detailed cost estimates that are developed based on the specific scope of work for the project. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13247.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 1. FiRM
Workpaper Group: 132470 - Distribution Circuit Reliability

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	4,594	4,594	4,594	0	0	0	4,594	4,594	4,594
Non-Labor	Zero-Based	53,186	53,186	53,186	0	0	0	53,186	53,186	53,186
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**57,780**	**57,780**	**57,780**	**0**	**0**	**0**	**57,780**	**57,780**	**57,780**
FTE	Zero-Based	45.9	45.9	45.9	0.0	0.0	0.0	45.9	45.9	45.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13247.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 1. FiRM
Workpaper Group: 132470 - Distribution Circuit Reliability

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	160	362	872	2,500
Non-Labor	0	3,038	8,128	7,762	44,368
NSE	0	0	0	0	0
Total	**0**	**3,199**	**8,490**	**8,634**	**46,868**
FTE	0.0	1.5	2.9	7.6	19.4
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	160	362	872	2,500
Non-Labor	0	3,038	8,128	7,762	44,368
NSE	0	0	0	0	0
Total	**0**	**3,199**	**8,490**	**8,634**	**46,868**
FTE	0.0	1.5	2.9	7.6	19.4
Vacation & Sick (Nominal $)					
Labor	0	25	58	135	415
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**25**	**58**	**135**	**415**
FTE	0.0	0.3	0.5	1.3	3.5
Escalation to 2016$					
Labor	0	13	16	14	0
Non-Labor	0	214	312	108	0
NSE	0	0	0	0	0
Total	**0**	**227**	**328**	**122**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	199	436	1,020	2,915
Non-Labor	0	3,252	8,440	7,870	44,368
NSE	0	0	0	0	0
Total	**0**	**3,451**	**8,876**	**8,890**	**47,282**
FTE	0.0	1.8	3.4	8.9	22.9

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13247.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 1. FiRM
Workpaper Group: 132470 - Distribution Circuit Reliability

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 132470

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13247.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 1. FiRM
Workpaper Group: 132470 - Distribution Circuit Reliability
Workpaper Detail: 132470.001 - RAMP - Base - FiRM

In-Service Date: Not Applicable

Description:

Examine distribution circuits in the backcountry and develop projects to harden the system based on known conditions

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	4,594	4,594	4,594
Non-Labor	53,186	53,186	53,186
NSE	0	0	0
Total	**57,780**	**57,780**	**57,780**
FTE	45.9	45.9	45.9

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13247.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	1. FiRM
Workpaper Group:	132470 - Distribution Circuit Reliability
Workpaper Detail:	132470.001 - RAMP - Base - FiRM

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: Fire Risk Mitigation (FiRM)

Program Description: Examine distribution circuits in the backcountry and develop projects to harden the system based on known conditions

Risk/Mitigation:

Risk: SDG&E Wildfires

Mitigation: System Hardening

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	57,165	57,166	57,166
High	74,315	74,316	74,316

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 54134

Explanation: Used GRID 2016 figures (includes BC 13247 & 14247)This item is all related to RAMP

Beginning of Workpaper Group
142490 - SF6 SWITCH REPLACEMENT

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14249.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 2. Repl all SF6 gas switches w non-gas switches
Workpaper Group: 142490 - SF6 SWITCH REPLACEMENT

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	35	722	2,888	2,888
Non-Labor	Zero-Based	0	0	0	0	425	2,787	11,200	11,200
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**459**	**3,509**	**14,088**	**14,088**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.2	7.2	28.8	28.8

Business Purpose:

This budget will provide funding to proactively remove or replace sulfur hexafluoride (SF6) gas insulated distribution switchgear. SF6 switches were primarily installed on SDG&E's electric distribution system during the 1980's and through the 2000's, as SF6 was the best insulation option available at that time. Since then, SF6 has been recognized by federal and state legislatures as a large contributor to elevated greenhouse gas levels, leading to the increased regulatory oversight in utility procedures involving SF6 switchgear. This project will reduce environmental risks associated with the potential for emissions. While the incremental cost to install monitoring equipment on substation circuit breakers is a small incremental cost, the cost to do the same for distribution would be greater than replacing the switch with a non-SF6 alternative. inspect, operate and maintain the electric distribution system.

Physical Description:

This budget will provide funding to proactively remove or replace sulfur hexafluoride (SF6) gas insulated distribution switchgear. SF6 switches were primarily installed on SDG&E's electric distribution system during the 1980's and through the 2000's, as SF6 was the best insulation option available at that time. Since then, SF6 has been recognized by federal and state legislatures as a large contributor to elevated greenhouse gas levels, leading to the increased regulatory oversight in utility procedures involving SF6 switchgear. This project will reduce environmental risks associated with the potential for emissions. While the incremental cost to install monitoring equipment on substation circuit breakers is a small incremental cost, the cost to do the same for distribution would be greater than replacing the switch with a non-SF6 alternative. inspect, operate and maintain the electric distribution system.

Project Justification:

The primary objective of this initiative is to reduce environmental risks associated with the potential for SF6 emissions. Sulfur hexafluoride is known to have a global warming potential of 23,900 times that of carbon dioxide, making its potential impact to global warming of interest. In an effort to reduce greenhouse gas emissions to 1990 levels, with a deadline to achieve by 2020, federal (EPA) & state (CARB) agencies have created respective regulations for utilities to adhere to. The SF6 emission rates are becoming more restrictive each year; 2018 = 3%, 2019 = 2%, and finally 2020 and beyond will be 1%. Both regulating agencies require utilities to track the "life" of a gas switch from "cradle-to-grave," as well as gas cylinder inventory and gas transfers in and out of switches. Removal and replacement of SF6 switches in SDG&E's distribution system will reduce the likelihood of SF6 emissions from leaking switches, thus reducing emission rates. The switch change-outs will also reduce the amount of recordkeeping required, therefore reducing errors and increasing accuracy. Other efforts at SDG&E are underway to reduce SF6 emissions risks, including leak detection and monitoring of substation gas circuit breakers.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14249.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	2. Repl all SF6 gas switches w non-gas switches
Workpaper Group:	142490 - SF6 SWITCH REPLACEMENT

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

NA

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14249.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 2. Repl all SF6 gas switches w non-gas switches
Workpaper Group: 142490 - SF6 SWITCH REPLACEMENT

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	722	2,888	2,888	0	0	0	722	2,888	2,888
Non-Labor	Zero-Based	2,787	11,200	11,200	0	0	0	2,787	11,200	11,200
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**3,509**	**14,088**	**14,088**	**0**	**0**	**0**	**3,509**	**14,088**	**14,088**
FTE	Zero-Based	7.2	28.8	28.8	0.0	0.0	0.0	7.2	28.8	28.8

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14249.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 2. Repl all SF6 gas switches w non-gas switches
Workpaper Group: 142490 - SF6 SWITCH REPLACEMENT

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	30
Non-Labor	0	0	0	0	425
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**454**
FTE	0.0	0.0	0.0	0.0	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	0	0	0	0	30
Non-Labor	0	0	0	0	425
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**454**
FTE	0.0	0.0	0.0	0.0	0.2
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	5
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**5**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	35
Non-Labor	0	0	0	0	425
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**459**
FTE	0.0	0.0	0.0	0.0	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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14249.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 2. Repl all SF6 gas switches w non-gas switches
Workpaper Group: 142490 - SF6 SWITCH REPLACEMENT

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 142490

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14249.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	2. Repl all SF6 gas switches w non-gas switches
Workpaper Group:	142490 - SF6 SWITCH REPLACEMENT
Workpaper Detail:	142490.001 - RAMP - Incremental Replace all SF6 gas switches with non-gas switches over multiple yea
In-Service Date:	Not Applicable

Description:

Replace all SF6 gas switches with non-gas switches over multiple years.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	722	2,888	2,888
Non-Labor	2,787	11,200	11,200
NSE	0	0	0
Total	**3,509**	**14,088**	**14,088**
FTE	7.2	28.8	28.8

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14249.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	2. Repl all SF6 gas switches w non-gas switches
Workpaper Group:	142490 - SF6 SWITCH REPLACEMENT
Workpaper Detail:	142490.001 - RAMP - Incremental Replace all SF6 gas switches with non-gas switches over multiple years

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: SF6 Switch Replacement

Program Description: SF6 Switches to be replaced with updated with new technology

Risk/Mitigation:

Risk: Outdated equipment

Mitigation: Replace with new technology

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 460

Explanation:

Beginning of Workpaper Group
152460 - RANCHO SANTA FE SUB FIRE HARDENING

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15246.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 3. RANCHO SANTA FE SUB FIRE HARDENING
Workpaper Group: 152460 - RANCHO SANTA FE SUB FIRE HARDENING

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	34	1,344	635	0
Non-Labor	Zero-Based	0	0	0	0	347	1,800	2,400	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**381**	**3,144**	**3,035**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.4	13.4	6.4	0.0

Business Purpose:

Rancho Santa Fe Substation is over 40 years old with the 4kv, 12kV, and 69kV constructed from the mid 1960s to the mid 1970s. It is the only substation serving the Rancho Santa Fe area and located in a fire threat zone.This substation serves several critical customers, including several communications companies, water facilities (Santa Fe Irrigation District, the Badger Plant, San Diego County Water Authority, Olivenhain Municipal Water District, & San Dieguito Water District whom all have critical pumping facilities), the Rancho Santa Fe Fire Department and the North County Dispatch JPA. The substation's control shelter needs to be replaced because it is too small for the control/protection requirements of the substation and is physically deteriorating. The 12kV switchgear is one of the oldest on the system and is not built to today's current reliability and safety standards. The substation is currently fed by a single 28MVA 69/12kV transformer and a 69/4kV transformer with an aging spare 12.5MVA 69/12kV transformer on stand-by and currently only has tie capacity to pick up approximately 38% of its load in case of a substation outage. The substation does not have distribution SCADA and has out-of-date transmission and distribution relaying without fault locating capability.

The objectives of this project are to replace aging equipment, improve distribution reliability, and fire harden the substation:

- Remove the aging 69/4kV transformer and 4kV equipment
- Replacement of the 40 year old 12kV switchgear.
- Replacement of one 69kV transmission oil breakers
- Replacement of open delta porcelain 69kV PT with a closed delta composite 69kV PT.
- Replacement of the control shelter.
- Replacement of 12kV capacitor
- Reconfiguration of 12kV to meet reliability and safety standards.
- Replacement of existing switchgear with two X sections of new switchgear.
- Installation of Distribution SCADA
- Replacement of existing 69/12kV 12.5MVA spare with an in-se

Physical Description:

The Rancho Santa Fe Substation fire hardening project will consist of removing the aging 69/4kV substation and cut it over to 12kV padmounts, replacement of aging infrastructure on the 12kV and 69kV equipment, replacement of the 12kV circuit getaways, replacement of the 12.5MVA 69/12kV spare with a 28MVA transformer, and installation of distribution SCADA

The ultimate arrangement of the substation will consist of three 69 kV TL breakers, one 69kV bus tie breaker, two 30 MVA 69/12 kV standard profile transformers, two quarter sections of switchgear, two 12 kV capacitors, one new control shelter, new relaying, SCADA, three 69 kV transmission lines, and eight distribution circuits.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15246.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	3. RANCHO SANTA FE SUB FIRE HARDENING
Workpaper Group:	152460 - RANCHO SANTA FE SUB FIRE HARDENING

Project Justification:

Rancho Santa Fe Substation, is over 40 years old with the 4kv, 12kV, and 69kV constructed from the mid 1960s to the mid 1970s. It is the only substation serving the Rancho Santa Fe area and located in a fire threat zone. This substation serves several critical customers, including several communications companies, water facilities (Santa Fe Irrigation District, the Badger Plant, San Diego County Water Authority, Olivenhain Municipal Water District, & San Dieguito Water District whom all have critical pumping facilities), the Rancho Santa Fe Fire Department and the North County Dispatch JPA. Its control shelter needs to be replaced because it is too small for the control/protection requirements of the substation and is physically deteriorating. The 12kV switchgear is one of the oldest on the
system and is not built to today's current reliability and safety standards. The substation is currently fed by a single 28MVA 69/12kV transformer and a 69/4kV transformer with an aging spare 12.5MVA 69/12kV transformer on stand- by and currently only has tie capacity to pick up approximately 38% of its load in case of a substation outage. The substation does not have distribution SCADA and has out-of-date transmission and distribution relaying without fault locating capability.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15246.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	3. RANCHO SANTA FE SUB FIRE HARDENING
Workpaper Group:	152460 - RANCHO SANTA FE SUB FIRE HARDENING

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15246.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 3. RANCHO SANTA FE SUB FIRE HARDENING
Workpaper Group: 152460 - RANCHO SANTA FE SUB FIRE HARDENING

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	1,344	635	0	1,344	635	0
Non-Labor	Zero-Based	0	0	0	1,800	2,400	0	1,800	2,400	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**3,144**	**3,035**	**0**	**3,144**	**3,035**	**0**
FTE	Zero-Based	0.0	0.0	0.0	13.4	6.4	0.0	13.4	6.4	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15246.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 3. RANCHO SANTA FE SUB FIRE HARDENING
Workpaper Group: 152460 - RANCHO SANTA FE SUB FIRE HARDENING

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	29
Non-Labor	0	0	0	0	347
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**376**
FTE	0.0	0.0	0.0	0.0	0.3
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	0	0	29
Non-Labor	0	0	0	0	347
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**376**
FTE	0.0	0.0	0.0	0.0	0.3
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	5
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**5**
FTE	0.0	0.0	0.0	0.0	0.1
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	34
Non-Labor	0	0	0	0	347
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**381**
FTE	0.0	0.0	0.0	0.0	0.4

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15246.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 3. RANCHO SANTA FE SUB FIRE HARDENING
Workpaper Group: 152460 - RANCHO SANTA FE SUB FIRE HARDENING

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 152460

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15246.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	3. RANCHO SANTA FE SUB FIRE HARDENING
Workpaper Group:	152460 - RANCHO SANTA FE SUB FIRE HARDENING
Workpaper Detail:	152460.001 - RANCHO SANTA FE SUB FIRE HARDENING
In-Service Date:	12/31/2018

Description:

TBD

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1,344	635	0
Non-Labor	1,800	2,400	0
NSE	0	0	0
Total	**3,144**	**3,035**	**0**
FTE	13.4	6.4	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
152570 - GOOGLE FIBER PROJECT (ED)

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15257.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 4. LARGE SCALE COMM. INFRASTRUCTURE PROVIDER
Workpaper Group: 152570 - GOOGLE FIBER PROJECT (ED)

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	1,656	1,656
Non-Labor	Zero-Based	0	0	0	0	21	0	3,364	3,364
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**21**	**0**	**5,020**	**5,020**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	16.6	16.6

Business Purpose:

Budget for SDG&E Pole Replacements that are initiated from large scale CIP attachment projects.

Physical Description:

A joint use application for a CIP Attachment Request is submitted and it is discovered that a SDG&E Pole Replacement is necessary.

Project Justification:

SDG&E is mandated per General Order 95 to replace any pole that is below a certain safety factor. If the safety factor is determined to be below the acceptable amount prior to a CIP attaching, then SDG&E is responsible for the pole change out. If a large scale project is initiated by a CIP, then it is anticipated there will be numerous pole change-outs.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15257.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	4. LARGE SCALE COMM. INFRASTRUCTURE PROVIDER
Workpaper Group:	152570 - GOOGLE FIBER PROJECT (ED)

Forecast Methodology:

Labor - Zero-Based

Derived estimated number of pole change outs that will be required based off of previous percentages from past pole load studies. Any projects are not anticipated to start until 2018 now.

Non-Labor - Zero-Based

Derived estimated number of pole change outs that will be required based off of previous percentages from past pole load studies. Any projects are not anticipated to start until 2018 now.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15257.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 4. LARGE SCALE COMM. INFRASTRUCTURE PROVIDER
Workpaper Group: 152570 - GOOGLE FIBER PROJECT (ED)

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	1,656	1,656	0	0	0	0	1,656	1,656
Non-Labor	Zero-Based	0	3,364	3,364	0	0	0	0	3,364	3,364
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**5,020**	**5,020**	**0**	**0**	**0**	**0**	**5,020**	**5,020**
FTE	Zero-Based	0.0	16.6	16.6	0.0	0.0	0.0	0.0	16.6	16.6

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15257.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 4. LARGE SCALE COMM. INFRASTRUCTURE PROVIDER
Workpaper Group: 152570 - GOOGLE FIBER PROJECT (ED)

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	21
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**21**
FTE	0.0	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	21
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**21**
FTE	0.0	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	21
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**21**
FTE	0.0	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15257.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 4. LARGE SCALE COMM. INFRASTRUCTURE PROVIDER
Workpaper Group: 152570 - GOOGLE FIBER PROJECT (ED)

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 152570

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15257.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	4. LARGE SCALE COMM. INFRASTRUCTURE PROVIDER
Workpaper Group:	152570 - GOOGLE FIBER PROJECT (ED)
Workpaper Detail:	152570.002 - LARGE SCALE COMM. INFRASTRUCTURE PROVIDER
In-Service Date:	Not Applicable

Description:

New CIP Attachment Requests and SDG&E Pole Replacement Responsibility

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	1,656	1,656
Non-Labor	0	3,364	3,364
NSE	0	0	0
Total	**0**	**5,020**	**5,020**
FTE	0.0	16.6	16.6

Note: Totals may include rounding differences.

Beginning of Workpaper Group
152590 - FIRE THREAT ZONE ADV PROTECT & SCADA UPG

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15259.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 5. FIRE THREAT ZONE ADV PROTECTION SCADA
Workpaper Group: 152590 - FIRE THREAT ZONE ADV PROTECT & SCADA UPG

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	109	623	623	623
Non-Labor	Zero-Based	0	0	0	0	1,559	714	714	714
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**1,668**	**1,337**	**1,337**	**1,337**
FTE	Zero-Based	0.0	0.0	0.0	0.0	1.1	6.2	6.2	6.2

Business Purpose:

The purpose of this project is to replace aging circuit breakers and/or obsolete electromechanical relays, to create a more comprehensive protection system by taking advantage of newer field technologies under installation by the FiRM project, and to create visibility in fire threat areas with installation of Distribution SCADA.

Some of the substations addressed by this project do not have distribution SCADA and has obsolete distribution relaying without fault locating capability.

The objectives of this project are to replace aging equipment, improve distribution reliability, and improve fire safety the substations:

- Reconfiguration of 12kV circuit breakers and relays to meet reliability and safety standards.
- Installation of Distribution SCADA.
- Installation of new transformer bank relays
- Installation of new 12kV Bus Differential relays
- Installation of microprocessor feeder relays.
- Install Advanced Protection devices to enhance feeder protection, reduce fire risk, and enable opportunities such as:
  - Falling conductor logic
  - Downed conductor detection (DCD)
  - Arc sensing technology (AST)
  - Advanced SGF (spike counting/adaptive set-point)
  - Remote event retrieval
  - Remote setting changes

Physical Description:

Fire Threat Zone Advanced Protection project will install new circuit breakers and/or relays to allow for improved protection functions and event recording for faults, create a protection system which will allow for communication of field devices with substation relays, install 12kV Bus Differential relays to improve overall protection and install Distribution SCADA system where appropriate.

Project Justification:

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15259.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	5. FIRE THREAT ZONE ADV PROTECTION SCADA
Workpaper Group:	152590 - FIRE THREAT ZONE ADV PROTECT & SCADA UPG

All substation affected by this project fall under the fire threat zone. This project will upgrade distribution relaying and associated breaker at these substation locations and improve system visibility for operators. It will allow for implementation of new relay standards with improved coordination in locations where device coordination is difficult due to lower fault currents. Lastly, once field devices are upgraded, it will allow for commication between field devices and substation feeder relays.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15259.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	5. FIRE THREAT ZONE ADV PROTECTION SCADA
Workpaper Group:	152590 - FIRE THREAT ZONE ADV PROTECT & SCADA UPG

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15259.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 5. FIRE THREAT ZONE ADV PROTECTION SCADA
Workpaper Group: 152590 - FIRE THREAT ZONE ADV PROTECT & SCADA UPG

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	623	623	623	0	0	0	623	623	623
Non-Labor	Zero-Based	714	714	714	0	0	0	714	714	714
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**1,337**	**1,337**	**1,337**	**0**	**0**	**0**	**1,337**	**1,337**	**1,337**
FTE	Zero-Based	6.2	6.2	6.2	0.0	0.0	0.0	6.2	6.2	6.2

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15259.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 5. FIRE THREAT ZONE ADV PROTECTION SCADA
Workpaper Group: 152590 - FIRE THREAT ZONE ADV PROTECT & SCADA UPG

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	0	94
Non-Labor	0	0	0	0	1,559
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**1,652**
FTE	0.0	0.0	0.0	0.0	0.9
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	0	0	94
Non-Labor	0	0	0	0	1,559
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**1,652**
FTE	0.0	0.0	0.0	0.0	0.9
Vacation & Sick (Nominal $)					
Labor	0	0	0	0	16
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**16**
FTE	0.0	0.0	0.0	0.0	0.2
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	0	0	109
Non-Labor	0	0	0	0	1,559
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**1,668**
FTE	0.0	0.0	0.0	0.0	1.1

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 15259.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 5. FIRE THREAT ZONE ADV PROTECTION SCADA
Workpaper Group: 152590 - FIRE THREAT ZONE ADV PROTECT & SCADA UPG

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 152590

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15259.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	5. FIRE THREAT ZONE ADV PROTECTION SCADA
Workpaper Group:	152590 - FIRE THREAT ZONE ADV PROTECT & SCADA UPG
Workpaper Detail:	152590.001 - RAMP - Incremental - FIRE THREAT ZONE ADV PROTECTION SCAD
In-Service Date:	Not Applicable

Description:

Fire Threat Zone Advanced Protection project will install new circuit breakers and/or relays to allow for improved protection functions and event recording for faults, create a protection system which will allow for communication of field devices with substation relays, install 12kV Bus Differential relays to improve overall protection and install Distribution SCADA system where appropriate.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	623	623	623
Non-Labor	714	714	714
NSE	0	0	0
Total	**1,337**	**1,337**	**1,337**
FTE	6.2	6.2	6.2

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	15259.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	5. FIRE THREAT ZONE ADV PROTECTION SCADA
Workpaper Group:	152590 - FIRE THREAT ZONE ADV PROTECT & SCADA UPG
Workpaper Detail:	152590.001 - RAMP - Incremental - FIRE THREAT ZONE ADV PROTECTION SCAD

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: Inspection, Repair, Maintenance & Replacement Programs

Program Description: Focusing on both feeder and branch lines within the Fire Threat Zone (FTZ), replace existing hardware. Replace small copper conductor with stronger new aluminum conductor

Risk/Mitigation:

Risk: SDG&E-01

Mitigation: Inspection, Repair, Maintenance & Replacement Programs

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	3,000	3,000	3,000
High	3,900	3,900	3,900

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: -

Historical Embedded Cost Estimates ($000)

Embedded Costs: 1668

Explanation: Used GRID 2016 figures.

Beginning of Workpaper Group
162520 - Electric Integrity Ramp

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16252.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 6. Overhead small wire and connector replacement
Workpaper Group: 162520 - Electric Integrity Ramp

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	197	4,001	12,182
Non-Labor	Zero-Based	0	0	0	0	0	591	10,857	40,224
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**788**	**14,858**	**52,406**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.9	40.0	121.8

Business Purpose:

Pursuant to proposed incremental capital activities described in the 2016 RAMP, this budget code represents a collection of projects implementing safety risk reduction measures in the Electric Infrastructure Integrity (EII) risk area. Several programs addressing key infrastructure improvement projects across electric distribution, substation, and transmission may be implemented as part of this initiative to proactively address the potential for premature asset failure

Physical Description:

SDG&E's 2016 RAMP Report documented safety risk insights across the entire service territory for its key safety risks, however narrowed in on the electric distribution system to address infrastructure with the highest relative potential safety risks. The proposed program scope includes overhead wire safety enhancements to safeguard against potential wire down events, corrosion mitigation programs (e.g. freeway crossing structural improvements), enhanced switch inspections and high-risk replacements, and potential strategic undergrounding of distribution lines where practical for frequent or relatively high consequence outage exposure areas. These infrastructure improvement programs generally target mitigating safety risks in the non-fire threat zone (non-FTZ) areas. These programs are all designed to be implemented as short, medium, and long-term projects in order to address various levels of safety risks. In general, shorter term projects aim to address areas believed to have higher propensities for failure coupled with greater safety, reliability, and financial impacts. Many these efforts are expected to span a period of 10 or more years and will address the top quartile of quantified safety risks. Other infrastructure improvements driven by potential safety risks continue to be assessed by SDG&E and will also be implemented in addition to or in place of the aforementioned programs. SDG&E continues to refine comprehensive risk quantification methodologies and will implement the appropriate measures to reduce risk exposure.

Project Justification:

In coordination with the CPUC's Safety and Enforcement Division (SED) to the assess potential safety risks, SDG&E participated in following the new GRC processes beginning in the TY2019 rate case, including the Safety Model Assessment Proceeding (S-MAP) and RAMP. The RAMP efforts led SDG&E to identify and quantify various areas for primarily safety-related risk mitigation with respect to infrastructure improvements that have potential to fail in a manner that may cause injuries to the public or personnel. As by design the RAMP process did not require the CPUC to issue a decision on the RAMP, but rather the provided SED and other relevant parties the opportunity to comment on SDG&E's RAMP Report. The programs as proposed in the RAMP quantified potential safety risk reductions across the enterprise, providing benefits to employees, the public, and SDG&E's contractors. These efforts are required to supplement other risk areas noted in the RAMP filing, including Wildfire Caused by SDG&E Equipment Failure.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the various projects within the EII program. SDG&E develops these detailed cost estimates, including input from similar work performed. Other factors include current construction labor rates, material costs, contract pricing/quotes, and other project specific details. The EII programs address enterprise asset classes, therefore comprehensive geographic information system (GIS) and other data are leveraged to identify long term strategies and the associated projected pace of development. Other inputs, including available engineering, design, construction resources, and other procedures required to obtain construction-ready status are also considered.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the various projects within the EII program. SDG&E develops these detailed cost estimates, including input from similar work performed. Other factors include current construction labor rates, material costs, contract pricing/quotes, and other project specific details. The EII programs address enterprise asset classes, therefore comprehensive geographic information system (GIS) and other data are leveraged to identify long term strategies and the associated projected pace of development. Other inputs, including available engineering, design, construction resources, and other procedures required to obtain construction-ready status are also considered.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16252.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 6. Overhead small wire and connector replacement
Workpaper Group: 162520 - Electric Integrity Ramp

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	197	4,001	12,182	197	4,001	12,182
Non-Labor	Zero-Based	0	0	0	591	10,857	40,224	591	10,857	40,224
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**788**	**14,858**	**52,406**	**788**	**14,858**	**52,406**
FTE	Zero-Based	0.0	0.0	0.0	1.9	40.0	121.8	1.9	40.0	121.8

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16252.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 6. Overhead small wire and connector replacement
Workpaper Group: 162520 - Electric Integrity Ramp

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16252.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 6. Overhead small wire and connector replacement
Workpaper Group: 162520 - Electric Integrity Ramp

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 162520

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.001 - RAMP - Incremental - Overhead small wire and connector replacement
In-Service Date:	Not Applicable

Description:

Overhead small wire and connector replacement

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	2,460	7,248
Non-Labor	0	6,240	25,409
NSE	0	0	0
Total	**0**	**8,700**	**32,657**
FTE	0.0	24.6	72.5

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.001 - RAMP - Incremental - Overhead small wire and connector replacement

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Overhead small wire and connector replacement

Program Description: The proposed scope includes eliminating #6, other small wire, and overhead connectors with relatively high propensity to cause wire down, outage, or public safety incidents (e.g. fire or injury/death), with continued focus on long spans greater than 400 feet. Expanded use of infrared technology should be employed to identify hot spots on overhead construction.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Wire Correction Program

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	31,488	31,488	31,488
High	40,934	40,934	40,934

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: no historical data, new budget code

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.002 - RAMP - Incremental - Switch Inspection and High-Risk Replacement
In-Service Date:	Not Applicable

Description:

Switch Inspection and High-Risk Replacement

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	91	276	910
Non-Labor	273	816	2,728
NSE	0	0	0
Total	**364**	**1,092**	**3,638**
FTE	0.9	2.7	9.1

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.002 - RAMP - Incremental - Switch Inspection and High-Risk Replacement

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Switch Inspection and High-Risk Replacement

Program Description: Distribution switches have higher propensity for failure and/or inoperability during an outage (or extending the impact of an outage to the next upstream protection device) causing a prolonged forced outage as crews are required to install additional jumpers or other workarounds. Switches that are constantly closed or opened (e.g. tie switches) are at increased risk of being inoperable when needed. The inoperable state of the switch poses safety risks to field operating personnel due to potential flash or overexertion by the employee.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Distribution Switch Maintenance Program - OH

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	3,638	3,638	3,638
High	4,729	4,729	4,729

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: na

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.003 - RAMP - Incremental - Anchor rod maintenance
In-Service Date:	Not Applicable

Description:

Anchor Rod Maintenance

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:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.003 - RAMP - Incremental - Anchor rod maintenance

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Anchor rod maintenance

Program Description: Proactively identify and replace at-risk anchor rods and guys that are susceptible to failure. Target all highway crossings, both single and double circuit. Assume three levels of corrosion - good, moderate, excessive - in which moderate and excessive wear will be replaced with a superior design and construction. Include study costs.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Civil/Structural & Environmental

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	125	125	125
High	163	163	163

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16252.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 6. Overhead small wire and connector replacement
Workpaper Group: 162520 - Electric Integrity Ramp
Workpaper Detail: 162520.004 - RAMP - Incremental - Strategic undergrounding

In-Service Date: Not Applicable

Description:

Strategic undergrounding

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	581	1,740
Non-Labor	0	1,745	5,237
NSE	0	0	0
Total	**0**	**2,326**	**6,977**
FTE	0.0	5.8	17.4

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.004 - RAMP - Incremental - Strategic undergrounding

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Strategic undergrounding

Program Description: The proposed scope includes proactively undergrounding overhead distribution in areas with high propensities for failure caused by weather, third parties, or aged infrastructure. Program will focus on areas not already covered by fire mitigation efforts or other programs.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Wire Correction Program

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	23,258	23,258	23,258
High	30,235	30,235	30,235

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.005 - RAMP - Incremental - Switch Inspection and High-Risk Replacement
In-Service Date:	Not Applicable

Description:

Switch Inspection and High-Risk Replacement

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	366	1,223
Non-Labor	0	1,101	3,667
NSE	0	0	0
Total	**0**	**1,467**	**4,890**
FTE	0.0	3.7	12.2

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.005 - RAMP - Incremental - Switch Inspection and High-Risk Replacement

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Switch Inspection and High-Risk Replacement

Program Description: Distribution switches have higher propensity for failure and/or inoperability during an outage (or extending the impact of an outage to the next upstream protection device) causing a prolonged forced outage as crews are required to install additional jumpers or other workarounds. Switches that are constantly closed or opened (e.g. tie switches) are at increased risk of being inoperable when needed. The inoperable state of the switch poses safety risks to field operating personnel due to potential flash or overexertion by the employee.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Distribution Switch Maintenance Program - UG

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	4,890	4,890	4,890
High	6,357	6,357	6,357

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.006 - RAMP - Incremental - Proactive at-risk identification and replacement of 600-amp tee c
In-Service Date:	Not Applicable

Description:

Proactive at-risk identification and replacement of 600-amp tee connectors

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	106	318	1,061
Non-Labor	318	955	3,183
NSE	0	0	0
Total	**424**	**1,273**	**4,244**
FTE	1.0	3.2	10.6

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16252.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	6. Overhead small wire and connector replacement
Workpaper Group:	162520 - Electric Integrity Ramp
Workpaper Detail:	162520.006 - RAMP - Incremental - Proactive at-risk identification and replacement of 600-amp tee connectors

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Proactive at-risk identification and replacement of 600-amp tee connectors

Program Description: 600 amp tees are used in underground connections in handholes, manholes, and at switch terminations. These tee failures, which often occur along feeder cables near the substation, cause forced outages to large customer counts and require extensive reconstruction in order to permanently restore the outage.

Risk/Mitigation:

Risk: Electric Infrastructure Integrity

Mitigation: Underground Connector Upgrade and Replacement Program

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	396	396	396
High	515	515	515

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
162550 - RTU Modernization

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16255.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 7. Black Start Project RAMP
Workpaper Group: 162550 - RTU Modernization

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	1,492	2,244	925
Non-Labor	Zero-Based	0	0	0	0	0	4,477	6,733	2,775
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**5,969**	**8,977**	**3,700**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	14.9	22.4	9.3

Business Purpose:

The project will resolve issues with the current SCADA system. This project will allow SDG&E to address current existing issues and move away from legacy communications protocol which is no longer supported. This project will also allow a more transparent view to our grid which will enhance our reliability and security of the grid.
The project will proactively modernized our SCADA Remote Terminal Units (RTU) and replace our old legacy equipment which is no longer supported.

Physical Description:

The new system will allow SDG&E to perform needed mission critical functionality of migrating over to IP base communications, address security vulnerability issues, enhance reliability for a seamless fail-over system if needed, replace legacy systems as well as equipment and upgrade RTU's for enhance visibility.
: Project scope will replace 465 legacy RTU’s (RMS900) in the field with a more modernized one to better support operations. These RTU’s are field sites only and does not include substation.

Project Justification:

SDG&E had been experiencing pain points with our existing SCADA system such as; lack of vendor support and extensive delay in response time, current SCADA vendor does not support Narrow-band IP communications (IP Communications provide enhanced reliability, security and scalability), atiquated user interface and inefficient development of SCADA screens, end of life for SCADA communication topology has been reached and existing SCADA vendor has been losing market shares in the industry.
We are trying to proactively support operations and prevent\eliminate unplanned outages. The current RMS900 RTU’s are no longer supported by their vendor.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16255.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	7. Black Start Project RAMP
Workpaper Group:	162550 - RTU Modernization

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16255.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 7. Black Start Project RAMP
Workpaper Group: 162550 - RTU Modernization

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	1,492	2,244	925	1,492	2,244	925
Non-Labor	Zero-Based	0	0	0	4,477	6,733	2,775	4,477	6,733	2,775
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**5,969**	**8,977**	**3,700**	**5,969**	**8,977**	**3,700**
FTE	Zero-Based	0.0	0.0	0.0	14.9	22.4	9.3	14.9	22.4	9.3

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16255.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 7. Black Start Project RAMP
Workpaper Group: 162550 - RTU Modernization

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16255.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 7. Black Start Project RAMP
Workpaper Group: 162550 - RTU Modernization

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 162550

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16255.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 7. Black Start Project RAMP
Workpaper Group: 162550 - RTU Modernization
Workpaper Detail: 162550.001 - RAMP - Incremental RTU MODERNIZATION - Post Filing

In-Service Date: 08/31/2019

Description:

RTU Modernization BC16277 Unavailable in GRID

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	271	1,050	925
Non-Labor	814	3,150	2,775
NSE	0	0	0
Total	**1,085**	**4,200**	**3,700**
FTE	2.7	10.5	9.3

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16255.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	7. Black Start Project RAMP
Workpaper Group:	162550 - RTU Modernization
Workpaper Detail:	162550.001 - RAMP - Incremental RTU MODERNIZATION - Post Filing

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: Addition of Bollard - RTU Modernization

Program Description: Migration to IP Base communication

Risk/Mitigation:

Risk: Outdated Unsoapported systems

Mitigation: Upgrade RTU's

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16255.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	7. Black Start Project RAMP
Workpaper Group:	162550 - RTU Modernization
Workpaper Detail:	162550.002 - RAMP - Incremental -SCADA MASTER MODERNIZATION - USED BC 16255 FOR BC 16276
In-Service Date:	07/31/2018

Description:

To replace

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1,221	1,194	0
Non-Labor	3,663	3,583	0
NSE	0	0	0
Total	**4,884**	**4,777**	**0**
FTE	12.2	11.9	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16255.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	7. Black Start Project RAMP
Workpaper Group:	162550 - RTU Modernization
Workpaper Detail:	162550.002 - RAMP - Incremental -SCADA MASTER MODERNIZATION - USED BC 16255 FOR BC 16276

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: SCADA Master Modernization

Program Description: Transmission/FERC Driven Porjects

Risk/Mitigation:

Risk: Outdated Equip Failure

Mitigation: Modernize Equip

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
162590 - NCW: New Bank 32

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16259.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 8. BC-16251 TP:C261 C262 C263 AND C266 RE-ROUTE
Workpaper Group: 162590 - NCW: New Bank 32

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	1,494
Non-Labor	Zero-Based	0	0	0	0	0	0	0	2,348
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3,842**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.9

Business Purpose:

The project is needed to eliminate a safety risk within the Torrey Pines area as the location of multiple poles currently introduce safety as well as reliability risk in the area. Relocating the equipment from overhead to underground will improve the safety and reliability risk in the area.

Physical Description:

The project requires new trench and conduit, as well as installing new underground cable. Four new cable poles are required along with four new hook sticks and the removal of overhead poles to relocate the distribution circuits from overhead to underground.

Project Justification:

There are 3 deteriorated poles in the Torrey Pines corridor that feed approximately 5,000 customers, including some very large industrial accounts. These poles have been drastically deteriorated and are located within a slope of a canyon that it potentially unstable soil. If an outage were to occur from either the poles collapsing or being washed away, the location within the canyon presents limited helicopter support and with the extremely sensitive environmental area where the poles are currently located limit ability to perform maintenance in a timely matter.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16259.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	8. BC-16251 TP:C261 C262 C263 AND C266 RE-ROUTE
Workpaper Group:	162590 - NCW: New Bank 32

Forecast Methodology:

Labor - Zero-Based

ZERO Based-The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

ZERO Based-The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

NA

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16259.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 8. BC-16251 TP:C261 C262 C263 AND C266 RE-ROUTE
Workpaper Group: 162590 - NCW: New Bank 32

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	0	1,494	0	0	1,494
Non-Labor	Zero-Based	0	0	0	0	0	2,348	0	0	2,348
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**3,842**	**0**	**0**	**3,842**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	14.9	0.0	0.0	14.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16259.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 8. BC-16251 TP:C261 C262 C263 AND C266 RE-ROUTE
Workpaper Group: 162590 - NCW: New Bank 32

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16259.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 8. BC-16251 TP:C261 C262 C263 AND C266 RE-ROUTE
Workpaper Group: 162590 - NCW: New Bank 32

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 162590

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16259.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 8. BC-16251 TP:C261 C262 C263 AND C266 RE-ROUTE
Workpaper Group: 162590 - NCW: New Bank 32
Workpaper Detail: 162590.001 - RAMP - Incremental OIR Circuits - Post Filing

In-Service Date: 09/30/2019

Description:

Route four circuits from a canyon location by trenching and installing 1000 kCMIL cable. Two new poles along with hook sticks to connect the circuits to existing overhead location.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	1,494
Non-Labor	0	0	2,348
NSE	0	0	0
Total	**0**	**0**	**3,842**
FTE	0.0	0.0	14.9

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16259.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	8. BC-16251 TP:C261 C262 C263 AND C266 RE-ROUTE
Workpaper Group:	162590 - NCW: New Bank 32
Workpaper Detail:	162590.001 - RAMP - Incremental OIR Circuits - Post Filing

RAMP Item # 1

RAMP Chapter: SDG&E-12

Program Name: NCW New Bank 32

Program Description: Undergrounding Overehead circuits

Risk/Mitigation:

Risk: Safety and Relibility Risk

Mitigation: Undergrounding

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
172420 - TWIN ENGINE HELICOPTER

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17242.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 9. TWIN ENGINE HELICOPTER
Workpaper Group: 172420 - TWIN ENGINE HELICOPTER

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	10,000	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**10,000**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

The purchase of a twin-engine helicopter addresses safety risks associated with helicopter operations, as well is providing a more capable aircraft.

Physical Description:

Currently, SDG&E contracts the exclusive use of a single-engine helicopter for flight operations. In order to address safety concerns and the need for a more capable aircraft, the decision has been made to acquire a twin-engine helicopter. Financial analysis demonstrates a lower cost to ratepayers over the life of the asset when the aircraft is purchased, as opposed to leased.

Project Justification:

From a safety perspective, a twin-engine helicopter provides redundant engine and flight control systems, advanced avionics to allow for instrument flight, and autopilot for reduced pilot fatigue. Regarding flight capabilities, a twin-engine helicopter provides for increased payload and power margins, integrated infrared & HD camera, and an improved maintenance program. From a financial perspective, cost analysis demonstrates it is more cost-effective to purchase the helicopter, as opposed to acquiring a lease.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17242.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	9. TWIN ENGINE HELICOPTER
Workpaper Group:	172420 - TWIN ENGINE HELICOPTER

Forecast Methodology:

Labor - Zero-Based

Zero Based

Non-Labor - Zero-Based

Zero Based

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17242.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 9. TWIN ENGINE HELICOPTER
Workpaper Group: 172420 - TWIN ENGINE HELICOPTER

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	0	0	0	10,000	0	0	10,000	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**10,000**	**0**	**0**	**10,000**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Forecast Adjustment Details

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17242.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 9. TWIN ENGINE HELICOPTER
Workpaper Group: 172420 - TWIN ENGINE HELICOPTER

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17242.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 9. TWIN ENGINE HELICOPTER
Workpaper Group: 172420 - TWIN ENGINE HELICOPTER

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 172420

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17242.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	9. TWIN ENGINE HELICOPTER
Workpaper Group:	172420 - TWIN ENGINE HELICOPTER
Workpaper Detail:	172420.001 - RAMP - Incremental -TWIN ENGINE HELICOPTER
In-Service Date:	09/30/2017

Description:

Purchase New Twin Engine Helicopter

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	10,000	0	0
NSE	0	0	0
Total	**10,000**	**0**	**0**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17242.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	9. TWIN ENGINE HELICOPTER
Workpaper Group:	172420 - TWIN ENGINE HELICOPTER
Workpaper Detail:	172420.001 - RAMP - Incremental -TWIN ENGINE HELICOPTER

RAMP Item # 1

RAMP Chapter: SDG&E-8

Program Name: Purchase a Twin-Engine Helicopter

Program Description: Purchase a Twin-Engine Helicopter

Risk/Mitigation:

Risk: SDG&E-08

Mitigation: Purchase a Twin-Engine Helicopter

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	7,650	0	0
High	11,050	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: -

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
172490 - TEE MODERNIZATION PROGRAM

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17249.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 10. 12/4KV SUBSTATION SECURITY: ALARM SYSTEM
Workpaper Group: 172490 - TEE MODERNIZATION PROGRAM

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	566	2,264	3,396
Non-Labor	Zero-Based	0	0	0	0	0	384	1,556	2,334
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**950**	**3,820**	**5,730**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	5.7	22.6	34.0

Business Purpose:

This budget provides funding to improve reliability and reduce safety risk by replacing aging 600A Tee connectors on circuits with multiple historical Tee failures and with high fault current. Tee connector failures have become one of the largest contributors to customer outages in the last few years.

Physical Description:

Replace aging 600A Tee connectors on circuits

Project Justification:

The 600A Tees are located on the main feeder of radial circuits. When they fail, all or most of the customers on a circuit experience a sustained outage. The modernization of tees provides a more reliable system that has more sectionalizing capability. Additionally, when tees fail, they can fail violently, which poses a serious safety risk to our field personnel and the general public.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17249.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	10. 12/4KV SUBSTATION SECURITY: ALARM SYSTEM
Workpaper Group:	172490 - TEE MODERNIZATION PROGRAM

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17249.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 10. 12/4KV SUBSTATION SECURITY: ALARM SYSTEM
Workpaper Group: 172490 - TEE MODERNIZATION PROGRAM

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	566	2,264	3,396	566	2,264	3,396
Non-Labor	Zero-Based	0	0	0	384	1,556	2,334	384	1,556	2,334
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**950**	**3,820**	**5,730**	**950**	**3,820**	**5,730**
FTE	Zero-Based	0.0	0.0	0.0	5.7	22.6	34.0	5.7	22.6	34.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17249.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 10. 12/4KV SUBSTATION SECURITY: ALARM SYSTEM
Workpaper Group: 172490 - TEE MODERNIZATION PROGRAM

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17249.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 10. 12/4KV SUBSTATION SECURITY: ALARM SYSTEM
Workpaper Group: 172490 - TEE MODERNIZATION PROGRAM

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 172490

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17249.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	10. 12/4KV SUBSTATION SECURITY: ALARM SYSTEM
Workpaper Group:	172490 - TEE MODERNIZATION PROGRAM
Workpaper Detail:	172490.001 - 12/4KV SUBSTATION SECURITY: ALARM SYSTEM - BC used for 17255 TEE Modernization
In-Service Date:	Not Applicable

Description:

TEE Modernization

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	566	2,264	3,396
Non-Labor	384	1,556	2,334
NSE	0	0	0
Total	**950**	**3,820**	**5,730**
FTE	5.7	22.6	34.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
17254A - Accelerated Pole Loading

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17254.0
Category: I. SAFETY & RISK MANAGEMENT
Category-Sub: 11. Accelerated Pole Loading
Workpaper Group: 17254A - Accelerated Pole Loading

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	370	560
Non-Labor	Zero-Based	0	0	0	0	0	270	4,212	39,870
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**270**	**4,582**	**40,430**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	3.7	5.6

Business Purpose:

"San Diego Gas & Electric owns and maintains approximately 200,000 wood distribution poles, 170,000 of which are currently out of scope of other projects (e.g. FiRM, CNF). All overhead electric facilities, including wood poles, must be designed, constructed, and maintained in accordance with General Order (GO) 95. The aged overhead electric system was designed in accordance with the requirements in place at the time of construction. Many of SDG&E's poles are greater than 40 years old, and have been subjected to increases in load due to additional attachments that have been added over the life of the facilities (e.g. fiber optic, antennas).
SDG&E has successfully utilized granular weather data and computer modeling to create a system-wide wind design map, which is based on our best possible prediction of "known local conditions." Today, SDG&E knows more about the weather conditions that the overhead electric system is exposed to than ever before. The level of data far surpasses what was used when many of the poles in our system were originally installed.
Since the original overhead electric system was first installed, not only has more local knowledge been obtained, new tools have been developed to enhance the accuracy of pole loading calculations. Distribution designs have historically utilized standards, which were based on conservative assumptions. Today, computer programs are available that not only make the design of poles more accurate, the programs also make it easier to perform more comprehensive analysis. Computer programs available today (e.g. PLS-CADD) allow Engineers and Designers to model structures using non-linear analysis and Finite Element Analysis. SDG&E is utilizing precise LiDAR (Light Detection and Ranging) data to develop a very accurate 3-dimensional model of the overhead electric system. Not only does LiDAR provide the data necessary to analyze pole loading, it also creates an opportunity to easily check wire-to-wire clearances.

Physical Description:

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17254.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	11. Accelerated Pole Loading
Workpaper Group:	17254A - Accelerated Pole Loading

The initial subset of poles will be made up of approximately 1,600 poles as a pilot phase spread across SDGE's service territory. Appropriate conclusions can be drawn geographically to determine the differences in expected outcome and population sizes that vary across SDG&E's service territory. This occurred with FiRM. We embarked on the program with an initial strategy, but as data came in and construction progressed, we saw the need to alter the methodology and approach for that program. The pilot phase of PRiME will occur in 2018 where 1600 poles will be analyzed. Results from the pilot phase will be used to prioritize future year projects based on risk and to further define cost. The program will begin to ramp up in 2019 where 3000 poles will be analyzed in 2020 where 16,300 poles will be analyzed, in 2021 to 2026 - 22,600 poles per year will be analyzed and in 2027 – 13,500 poles will be analyzed.
The focus of the PRiME efforts will be on pole loading (clearances will be checked, but that is not the primary driver in this case). In the case of PRiME, SDG&E plans on using a risk based model that considers many factors to identify pole failure risk potential. Some of the risk factors that will be included in the model are locally known conditions (wind), age of pole, intrusive inspection data, un-guyed structures, conductor size/type, load of Communications Infrastructure Providers and conductor size. Once facilities are identified for replacement, PLS-CADD will then be used to build a 3-dimensional model of the overhead ruling span (dead end to dead end) to ensure the pole replacement work takes into account the dynamic interactions with other poles, and that the pole replacement work does not diminish the performance of the other poles within the ruling span.

Project Justification:

This program will significantly lower the potential risks that non-compliant poles can result in if a failure were to occur such as personal injury, property damage, and fire ignition. Increased CPUC oversight on PLC's and the potential for the CPUC to levy large fines if a pole fails and causes damage. This program will ensure poles meet GO 95 standards by ensuring poles meet locally known conditions (wind), meet loading safety factor and clearance criteria as well as other conditions that are known to be a risk.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17254.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	11. Accelerated Pole Loading
Workpaper Group:	17254A - Accelerated Pole Loading

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 17254A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17254.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	11. Accelerated Pole Loading
Workpaper Group:	17254A - Accelerated Pole Loading
Workpaper Detail:	17254A.001 - RAMP - Base - Accelerated Pole Loading - QA QC Portion is RAMP
In-Service Date:	10/31/2019

Description:

Pole loading Inspection

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	370	560
Non-Labor	270	4,212	39,870
NSE	0	0	0
Total	**270**	**4,582**	**40,430**
FTE	0.0	3.7	5.6

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17254.0
Category:	I. SAFETY & RISK MANAGEMENT
Category-Sub:	11. Accelerated Pole Loading
Workpaper Group:	17254A - Accelerated Pole Loading
Workpaper Detail:	17254A.001 - RAMP - Base - Accelerated Pole Loading - QA QC Portion is RAMP

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: QA/QC Program

Program Description: Annually inspect 1/3 of the facilities within the HRFA and repair potential sources of ignition before fire season

Risk/Mitigation:

Risk: SDG&E-01

Mitigation: Inspection, Repair, Maintenance & Replacement Programs

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	920	920	920
High	1,196	1,196	1,196

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Construction Start Date:

In Service Date:10/31/2019

Work Type: Mandated

Work Type Citation: a

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: J. DER INTEGRATION
Workpaper: VARIOUS

Summary for Category: J. DER INTEGRATION

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	971	985	4,701	3,858
Non-Labor	2,283	2,313	13,642	14,158
NSE	0	0	0	0
Total	**3,254**	**3,298**	**18,343**	**18,016**
FTE	8.0	9.9	47.0	37.8
112460 SMART TRANSFORMERS				
Labor	3	58	0	0
Non-Labor	3	200	0	0
NSE	0	0	0	0
Total	**6**	**258**	**0**	**0**
FTE	0.0	0.6	0.0	0.0
112470 ADVANCED ENERGY STORAGE				
Labor	1	0	1,154	2,239
Non-Labor	6	0	4,000	7,761
NSE	0	0	0	0
Total	**7**	**0**	**5,154**	**10,000**
FTE	0.0	0.0	11.5	22.4
142430 Microgrid Systems for Reliability				
Labor	967	396	115	0
Non-Labor	2,274	1,373	400	0
NSE	0	0	0	0
Total	**3,241**	**1,769**	**515**	**0**
FTE	8.0	4.0	1.2	0.0
14259A Vandium Flow Battery				
Labor	0	289	0	0
Non-Labor	0	250	0	0
NSE	0	0	0	0
Total	**0**	**539**	**0**	**0**
FTE	0.0	2.9	0.0	0.0
162430 Microgrid for Energy Risilience				
Labor	0	0	1,179	1,583
Non-Labor	0	0	4,715	6,333
NSE	0	0	0	0
Total	**0**	**0**	**5,894**	**7,916**
FTE	0.0	0.0	11.8	15.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: J. DER INTEGRATION
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
17244A VOLT/VAR OPTIMIZATION TRANSFORMER				
Labor	0	0	173	36
Non-Labor	0	0	327	64
NSE	0	0	0	0
Total	**0**	**0**	**500**	**100**
FTE	0.0	0.0	1.7	0.4
172450 ITF-INTEGRATED TEST FACILITY				
Labor	0	173	350	0
Non-Labor	0	350	700	0
NSE	0	0	0	0
Total	**0**	**523**	**1,050**	**0**
FTE	0.0	1.7	3.5	0.0
172460 BORREGO MICROGRID 3.0				
Labor	0	69	1,730	0
Non-Labor	0	140	3,500	0
NSE	0	0	0	0
Total	**0**	**209**	**5,230**	**0**
FTE	0.0	0.7	17.3	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
112460 - SMART TRANSFORMERS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11246.0
Category: J. DER INTEGRATION
Category-Sub: 1. SMART TRANSFORMERS
Workpaper Group: 112460 - SMART TRANSFORMERS

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	40	6	2	0	3	58	0	0
Non-Labor	Zero-Based	388	1,431	32	39	3	200	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**428**	**1,437**	**34**	**39**	**7**	**258**	**0**	**0**
FTE	Zero-Based	0.3	0.0	0.0	0.0	0.0	0.6	0.0	0.0

Business Purpose:

Beginning in 2010 plug-in electric vehicles began to be deployed in the SDG&E service territory. The rate of deployment will increase substantially between now and 2020. SDG&E is concerned about the effect of electric vehicle charging on distribution transformer loading and operation. In order to determine the effect of electric vehicle charging on the transformer it is necessary to perform on-line monitoring at the transformer. Smart Transformers will be the method used to perform this task. Distribution transformers will be converted to smart devices by installing monitoring equipment on the secondary transformer bushings, which will be performed as part of phase 1 of this project.

Physical Description:

This project will install monitoring devices on all transformers serving customers with charging stations for plug-in electric vehicles that are purchased between 2010 and 2020. Sensing devices attached to the transformers will be used to monitor real-time loading and establish accurate load profiles. These devices must also be capable of communicating load information to a data center in a distribution substation.

Project Justification:

The main reason for this project is for SDG&E to learn about the plug-in electric vehicle charging patterns of customers on a real time basis. This information is important in determining the effects of electric vehicle charging on distribution transformers. The information will also be useful in determining if loading guidelines for transformers serving customers with plug-in electric vehicles need to be revised. This load data would also be used to proactively troubleshoot customer voltage problems that could occur due to an overloaded transformer.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11246.0
Category:	J. DER INTEGRATION
Category-Sub:	1. SMART TRANSFORMERS
Workpaper Group:	112460 - SMART TRANSFORMERS

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11246.0
Category: J. DER INTEGRATION
Category-Sub: 1. SMART TRANSFORMERS
Workpaper Group: 112460 - SMART TRANSFORMERS

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	58	0	0	0	0	0	58	0	0
Non-Labor	Zero-Based	200	0	0	0	0	0	200	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**258**	**0**	**0**	**0**	**0**	**0**	**258**	**0**	**0**
FTE	Zero-Based	0.6	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11246.0
Category: J. DER INTEGRATION
Category-Sub: 1. SMART TRANSFORMERS
Workpaper Group: 112460 - SMART TRANSFORMERS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	31	5	2	0	3
Non-Labor	350	1,337	31	39	3
NSE	0	0	0	0	0
Total	**381**	**1,342**	**32**	**39**	**6**
FTE	0.3	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	31	5	2	0	3
Non-Labor	350	1,337	31	39	3
NSE	0	0	0	0	0
Total	**381**	**1,342**	**32**	**39**	**6**
FTE	0.3	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	5	1	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**5**	**1**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	4	0	0	0	0
Non-Labor	38	94	1	1	0
NSE	0	0	0	0	0
Total	**42**	**95**	**1**	**1**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	40	6	2	0	3
Non-Labor	388	1,431	32	39	3
NSE	0	0	0	0	0
Total	**428**	**1,437**	**34**	**39**	**7**
FTE	0.3	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11246.0
Category: J. DER INTEGRATION
Category-Sub: 1. SMART TRANSFORMERS
Workpaper Group: 112460 - SMART TRANSFORMERS

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 112460

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11246.0
Category: J. DER INTEGRATION
Category-Sub: 1. SMART TRANSFORMERS
Workpaper Group: 112460 - SMART TRANSFORMERS
Workpaper Detail: 112460.001 - SMART TRANSFORMERS

In-Service Date: 12/31/2017

Description:

This project will install monitoring devices on all transformers serving customers with charging stations for plug-in electric vehicles that are purchased between 2010 and 2020. Sensing devices attached to the transformers will be used to monitor real-time loading and establish accurate load profiles. These devices must also be capable of communicating load information to a data center in a distribution substation.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	58	0	0
Non-Labor	200	0	0
NSE	0	0	0
Total	**258**	**0**	**0**
FTE	0.6	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
112470 - ADVANCED ENERGY STORAGE

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11247.0
Category: J. DER INTEGRATION
Category-Sub: 2. ADVANCED ENERGY STORAGE
Workpaper Group: 112470 - ADVANCED ENERGY STORAGE

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	208	111	179	143	1	0	1,154	2,239
Non-Labor	Zero-Based	10,761	6,199	8,863	3,355	6	0	4,000	7,761
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**10,968**	**6,310**	**9,042**	**3,499**	**6**	**0**	**5,154**	**10,000**
FTE	Zero-Based	1.7	1.2	1.7	1.3	0.0	0.0	11.5	22.4

Business Purpose:

Mitigate intermittency and operational problems from renewable energy sources by installing energy storage on distribution circuits that have a high concentration of photovoltaic (PV) systems. Additionally, energy storage will provide benefits such as peak shaving and reactive power support. Energy Storage coupled with advanced inverter functionality allows for 4-quadrant operational support; therefore, enabling Distributed Energy Resource (DER) implementation by way of Photovoltaic (PV) smoothing, voltage control and increasing reliability. Energy Storage and renewable generation may not share the same point of common coupling when installed on a distribution circuit. Therefore, further installation and analysis is needed to determine the effectiveness of PV smoothing and voltage control when the generation and storage are decoupled.

Physical Description:

Install energy storage in the form of electric batteries on the electric distribution system.

Project Justification:

Advanced energy storage devices will help minimize impacts of intermittency and operational problems associated with the variable output of renewable energy resources. The solution will place distributed energy storage system on circuits with a high penetration of distributed energy resources (e.g. customer photovoltaic systems).

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11247.0
Category:	J. DER INTEGRATION
Category-Sub:	2. ADVANCED ENERGY STORAGE
Workpaper Group:	112470 - ADVANCED ENERGY STORAGE

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11247.0
Category: J. DER INTEGRATION
Category-Sub: 2. ADVANCED ENERGY STORAGE
Workpaper Group: 112470 - ADVANCED ENERGY STORAGE

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	1,154	2,239	0	0	0	0	1,154	2,239
Non-Labor	Zero-Based	0	4,000	7,761	0	0	0	0	4,000	7,761
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**5,154**	**10,000**	**0**	**0**	**0**	**0**	**5,154**	**10,000**
FTE	Zero-Based	0.0	11.5	22.4	0.0	0.0	0.0	0.0	11.5	22.4

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017 Total		0	0	0	0	0.0	
2018	Other	1,154	4,000	0	5,154	11.5	LPINEDA20161201160103493
Explanation:	tbd						
2018	Other	-1,000	-4,000	0	-5,000	-11.5	LPINEDA20161201160421350
Explanation:	tbd						
2018	Other	-154	0	0	-154	0.0	LPINEDA20161201161901247
Explanation:	TO CORRECT LABOR ADJUSTMENTS						
2018 Total		0	0	0	0	0.0	
2019	Other	461	1,600	0	2,061	4.6	LPINEDA20161201160200543
Explanation:	tbd						
2019	Other	-461	-1,600	0	-2,061	-4.6	LPINEDA20161201160559367
Explanation:	tbd						
2019	Other	61	0	0	61	0.6	LPINEDA20161201160730773
Explanation:	tbd						
2019	Other	-61	0	0	-61	0.0	LPINEDA20161201162013510
Explanation:	TO CORRECT LABOR ADJUSTMENT						
2019	Other	0	0	0	0	-0.6	LPINEDA20161201162153073
Explanation:	TO CORRECT FTE						
2019 Total		0	0	0	0	0.0	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11247.0
Category: J. DER INTEGRATION
Category-Sub: 2. ADVANCED ENERGY STORAGE
Workpaper Group: 112470 - ADVANCED ENERGY STORAGE

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	163	89	149	122	0
Non-Labor	9,703	5,791	8,535	3,309	6
NSE	0	0	0	0	0
Total	**9,866**	**5,880**	**8,683**	**3,432**	**6**
FTE	1.5	1.0	1.4	1.1	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	163	89	149	122	0
Non-Labor	9,703	5,791	8,535	3,309	6
NSE	0	0	0	0	0
Total	**9,866**	**5,880**	**8,683**	**3,432**	**6**
FTE	1.5	1.0	1.4	1.1	0.0
Vacation & Sick (Nominal $)					
Labor	24	14	24	19	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**24**	**14**	**24**	**19**	**0**
FTE	0.2	0.2	0.3	0.2	0.0
Escalation to 2016$					
Labor	20	7	7	2	0
Non-Labor	1,058	408	328	46	0
NSE	0	0	0	0	0
Total	**1,078**	**415**	**335**	**48**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	208	111	179	143	1
Non-Labor	10,761	6,199	8,863	3,355	6
NSE	0	0	0	0	0
Total	**10,968**	**6,310**	**9,042**	**3,499**	**6**
FTE	1.7	1.2	1.7	1.3	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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11247.0
Category: J. DER INTEGRATION
Category-Sub: 2. ADVANCED ENERGY STORAGE
Workpaper Group: 112470 - ADVANCED ENERGY STORAGE

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 112470

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11247.0
Category:	J. DER INTEGRATION
Category-Sub:	2. ADVANCED ENERGY STORAGE
Workpaper Group:	112470 - ADVANCED ENERGY STORAGE
Workpaper Detail:	112470.001 - ADVANCED ENERGY STORAGE
In-Service Date:	12/31/2019

Description:

Convert the existing 1404 existing line capacitors to SCADA control.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	1,154	2,239
Non-Labor	0	4,000	7,761
NSE	0	0	0
Total	**0**	**5,154**	**10,000**
FTE	0.0	11.5	22.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
142430 - Microgrid Systems for Reliability

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14243.0
Category: J. DER INTEGRATION
Category-Sub: 3. Borrego Microgrid 2.0
Workpaper Group: 142430 - Microgrid Systems for Reliability

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	306	336	967	396	115	0
Non-Labor	Zero-Based	0	0	861	2,021	2,274	1,373	400	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**1,168**	**2,357**	**3,241**	**1,769**	**515**	**0**
FTE	Zero-Based	0.0	0.0	2.6	2.8	8.0	4.0	1.2	0.0

Business Purpose:

The residents of Borrego Springs are radially fed by a single transmission line from Narrows to Borrego Springs Substation. This project allows for better utilization of the Borrego Springs Microgrid in responding to a variety of outage situations, demand response requests, and voltage/frequency regulation. By leveraging various new technologies and resources, as well as adding, hardening, and reconfiguring key infrastructure, the newly enhanced Microgrid will become more flexible and automated for increased Microgrid capabilities.

Physical Description:

The Borrego Springs Microgrid 2.0 project consists of two phases. Phase 1 of the project involves near term solutions to operationalizing the Microgrid, specifically allowing EDO to operate the Microgrid as an asset and the resolution of the Noise Ordinance compliance. Phase 2 of the project involves increasing the operational flexibility and capability of the current Microgrid. This will include hardening key distribution infrastructure, additional SCADA devices, and upgrades to the protection schemes.

Project Justification:

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14243.0
Category:	J. DER INTEGRATION
Category-Sub:	3. Borrego Microgrid 2.0
Workpaper Group:	142430 - Microgrid Systems for Reliability

The community of Borrego Springs is in the middle of the Anza Borrego Dessert, in a remote and isolated region, and subject to frequent and severe weather conditions, including high temperatures above 120 degrees Fahrenheit, high winds, flash floods and lightening. SDG&E has learned through the Borrego Springs Microgrid Demonstration (BSMD) Project, that a Microgrid can be an effective solution to mitigating outage impacts. During the first BSMD project from 2011 to 2014 the Microgrid successfully demonstrated the ability to temporarily island a single circuit. Since then, the BSMD project has been expanded to include the entire load and utilize the NRG Solar Facility to provide renewable generation during the day. In its current configuration, many challenges have been encountered while trying to utilize the Microgrid to serve the entire community during the day with only renewable generation, while maintaining electric service to critical loads of Borrego. The current challenges will be mitigated with the following goals in mind:

- Enhance Emergency Readiness
- Increase Operational Flexibility
- Decrease Outage Response Time
- Decrease Interruptions & Increase Grid Resiliency
- Demonstrate New Microgrid Technologies
- Increase Microgrid Load Capacity

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14243.0
Category:	J. DER INTEGRATION
Category-Sub:	3. Borrego Microgrid 2.0
Workpaper Group:	142430 - Microgrid Systems for Reliability

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14243.0
Category: J. DER INTEGRATION
Category-Sub: 3. Borrego Microgrid 2.0
Workpaper Group: 142430 - Microgrid Systems for Reliability

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	396	115	0	0	0	0	396	115	0
Non-Labor	Zero-Based	1,373	400	0	0	0	0	1,373	400	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**1,769**	**515**	**0**	**0**	**0**	**0**	**1,769**	**515**	**0**
FTE	Zero-Based	4.0	1.2	0.0	0.0	0.0	0.0	4.0	1.2	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14243.0
Category: J. DER INTEGRATION
Category-Sub: 3. Borrego Microgrid 2.0
Workpaper Group: 142430 - Microgrid Systems for Reliability

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	254	287	830
Non-Labor	0	0	830	1,994	2,274
NSE	0	0	0	0	0
Total	**0**	**0**	**1,084**	**2,280**	**3,104**
FTE	0.0	0.0	2.2	2.4	6.8
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	254	287	830
Non-Labor	0	0	830	1,994	2,274
NSE	0	0	0	0	0
Total	**0**	**0**	**1,084**	**2,280**	**3,104**
FTE	0.0	0.0	2.2	2.4	6.8
Vacation & Sick (Nominal $)					
Labor	0	0	41	44	138
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**41**	**44**	**138**
FTE	0.0	0.0	0.4	0.4	1.2
Escalation to 2016$					
Labor	0	0	11	5	0
Non-Labor	0	0	32	28	0
NSE	0	0	0	0	0
Total	**0**	**0**	**43**	**32**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	306	336	967
Non-Labor	0	0	861	2,021	2,274
NSE	0	0	0	0	0
Total	**0**	**0**	**1,168**	**2,357**	**3,241**
FTE	0.0	0.0	2.6	2.8	8.0

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14243.0
Category: J. DER INTEGRATION
Category-Sub: 3. Borrego Microgrid 2.0
Workpaper Group: 142430 - Microgrid Systems for Reliability

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 142430

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14243.0
Category:	J. DER INTEGRATION
Category-Sub:	3. Borrego Microgrid 2.0
Workpaper Group:	142430 - Microgrid Systems for Reliability
Workpaper Detail:	142430.001 - Borrego Microgrid 2.0
In-Service Date:	03/31/2018

Description:

The Borrego Springs Microgrid 2.0 project consists of two phases. Phase 1 of the project involves near term solutions to operationalizing the Microgrid, specifically allowing EDO to operate the Microgrid as an asset and the resolution of the Noise Ordinance compliance. Phase 2 of the project involves increasing the operational flexibility and capability of the current Microgrid. This will include hardening key distribution infrastructure, additional SCADA devices, and upgrades to the protection schemes.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	396	115	0
Non-Labor	1,373	400	0
NSE	0	0	0
Total	**1,769**	**515**	**0**
FTE	4.0	1.2	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
14259A - Vandium Flow Battery

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14259.0
Category: J. DER INTEGRATION
Category-Sub: 4. Vandium Flow Battery
Workpaper Group: 14259A - Vandium Flow Battery

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	289	0	0
Non-Labor	Zero-Based	0	0	0	0	0	250	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**539**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0

Business Purpose:

The purpose of this budget is to install and evaluate a Vanadium-Redox Flow (VRF) Battery system (up to 2MW / 8 MWh) with support from The New Energy and Industrial Technology Development Organization (NEDO), Japan's DOE, to assess appropriateness for SDG&E's needs.

Physical Description:

NEDO is targeting strategic partnerships in the US for grid technology demonstrations of energy storage. NEDO has selected Sumitomo to conduct VRF demonstrations in California. NEDO will fund up to $10M per site for Sumitomo's VRF. CA IOUs have been courted due to existing FERC and CPUC drivers.VFR system will be installed for demonstration of grid support and market functions.

Project Justification:

Flow battery technologies are appropriate for MW scale energy storage applications; however no North American demonstrations have been conducted. This project enables a low cost/low risk VFR demonstration at relatively low cost to SDG&E.The objectives of this project include:

- Evaluate systems' size/performance: 4 MWh VFR footprint = 'tennis court' with claimed infinite cycle life
- Validate flow systems relevance for multi-MWh applications – i.e. substation and larger
- Address ablility of system to perform market functions (CAISO market) in addition to grid services
- Differentiate VRF system performance from Lithium

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14259.0
Category:	J. DER INTEGRATION
Category-Sub:	4. Vandium Flow Battery
Workpaper Group:	14259A - Vandium Flow Battery

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 14259A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14259.0
Category:	J. DER INTEGRATION
Category-Sub:	4. Vandium Flow Battery
Workpaper Group:	14259A - Vandium Flow Battery
Workpaper Detail:	14259A.001 - Vandium Flow Battery
In-Service Date:	06/30/2017

Description:

NEDO is targeting strategic partnerships in the US for grid technology demonstrations of energy storage. NEDO has selected Sumitomo to conduct VRF demonstrations in California. NEDO will fund up to $10M per site for Sumitomo's VRF. CA IOUs have been courted due to existing FERC and CPUC drivers.VFR system will be installed for demonstration of grid support and market functions.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	289	0	0
Non-Labor	250	0	0
NSE	0	0	0
Total	**539**	**0**	**0**
FTE	2.9	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
162430 - Microgrid for Energy Risilience

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16243.0
Category: J. DER INTEGRATION
Category-Sub: 5. Microgrid for Energy Resilience
Workpaper Group: 162430 - Microgrid for Energy Risilience

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	1,179	1,583
Non-Labor	Zero-Based	0	0	0	0	0	0	4,715	6,333
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**5,894**	**7,916**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	11.8	15.0

Business Purpose:

The purpose of this project focuses on utilizing microgrids to alleviate renewable intermittency, allowing for increased renewable energy penetration levels, and to enhance electric service reliability. Depending on the size of the microgrid, renewable energy may be in the form of smaller or larger sources connected to the distribution feeder.

Physical Description:

This project will focus on funding engineering and construct solutions utilizing Microgrids and DER to enhance energy resilience for public purpose and critical applications.

Project Justification:

SDG&E has demonstrated that Microgrids can provide additional reliability, operational flexibility and allow system operators to incorporate renewable energy. To date, SDG&E has been approached and invited to propose projects for local agencies and the military, and this project will provide the funds for these solutions.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16243.0
Category:	J. DER INTEGRATION
Category-Sub:	5. Microgrid for Energy Resilience
Workpaper Group:	162430 - Microgrid for Energy Risilience

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16243.0
Category: J. DER INTEGRATION
Category-Sub: 5. Microgrid for Energy Resilience
Workpaper Group: 162430 - Microgrid for Energy Risilience

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	1,179	1,583	0	1,179	1,583
Non-Labor	Zero-Based	0	0	0	0	4,715	6,333	0	4,715	6,333
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**5,894**	**7,916**	**0**	**5,894**	**7,916**
FTE	Zero-Based	0.0	0.0	0.0	0.0	11.8	15.0	0.0	11.8	15.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16243.0
Category: J. DER INTEGRATION
Category-Sub: 5. Microgrid for Energy Resilience
Workpaper Group: 162430 - Microgrid for Energy Risilience

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16243.0
Category: J. DER INTEGRATION
Category-Sub: 5. Microgrid for Energy Resilience
Workpaper Group: 162430 - Microgrid for Energy Risilience

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 162430

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16243.0
Category:	J. DER INTEGRATION
Category-Sub:	5. Microgrid for Energy Resilience
Workpaper Group:	162430 - Microgrid for Energy Risilience
Workpaper Detail:	162430.001 - Microgrid for Energy Resilience
In-Service Date:	12/31/2019

Description:

Microgrids and energy storage to enhance system reliability and capacity for public purpose

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	1,179	1,583
Non-Labor	0	4,715	6,333
NSE	0	0	0
Total	**0**	**5,894**	**7,916**
FTE	0.0	11.8	15.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
17244A - VOLT/VAR OPTIMIZATION TRANSFORMER

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17244.0
Category: J. DER INTEGRATION
Category-Sub: 6. VOLT/VAR OPTIMIZATION TRANSFORMER
Workpaper Group: 17244A - VOLT/VAR OPTIMIZATION TRANSFORMER

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	173	36
Non-Labor	Zero-Based	0	0	0	0	0	0	327	64
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**500**	**100**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.4

Business Purpose:

With an increase of photovoltaic (PV) installs, the service territory has seen a change in voltage profiles. Through AMI analysis, we have found that several distribution circuits have violated the ANSI standard of +/- 5% of nominal. This can cause damage to customer equipment, and also potentially decrease energy efficiency. The purpose of this project is to optimize our voltage profile by installing Gridco secondary devices. By optimizing the profile, we will be more energy efficient and maintain ANSI standards.

Physical Description:

This project will install Gridco secondary regulation devices to correct voltage issues (low or high) on the secondary network (240V).

Project Justification:

The primary objective of this project is to improve energy efficiency and maintain secondary voltage compliance per ANSI standards. With an increase of photovoltaic (PV) installations, SDG&E has seen a change in voltage profiles.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17244.0
Category:	J. DER INTEGRATION
Category-Sub:	6. VOLT/VAR OPTIMIZATION TRANSFORMER
Workpaper Group:	17244A - VOLT/VAR OPTIMIZATION TRANSFORMER

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

NA

Beginning of Workpaper Sub Details for
Workpaper Group 17244A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17244.0
Category: J. DER INTEGRATION
Category-Sub: 6. VOLT/VAR OPTIMIZATION TRANSFORMER
Workpaper Group: 17244A - VOLT/VAR OPTIMIZATION TRANSFORMER
Workpaper Detail: 17244A.001 - VOLT/VAR OPTIMIZATION TRANSFORMER

In-Service Date: Not Applicable

Description:

VOLT/VAR OPTIMIZATION TRANSFORMER

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	173	36
Non-Labor	0	327	64
NSE	0	0	0
Total	**0**	**500**	**100**
FTE	0.0	1.7	0.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
172450 - ITF-INTEGRATED TEST FACILITY

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17245.0
Category: J. DER INTEGRATION
Category-Sub: 7. ITF-INTEGRATED TEST FACILITY
Workpaper Group: 172450 - ITF-INTEGRATED TEST FACILITY

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	173	350	0
Non-Labor	Zero-Based	0	0	0	0	0	350	700	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**523**	**1,050**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.7	3.5	0.0

Business Purpose:

The Integrated Test Facility (ITF) has hosted projects for, but is not limited to, renewable integration, electric vehicle charging, Home Area Networks (HAN), cyber security and telecommunication advancement. The current projects have maximized available bench space and simulation capacity requiring expansion. The ITF uses a Real-Time Digital Simulator (RTDS) to test actual products such as inverters, electric vehicle (EV) chargers, and various other controllers under hardware in the loop. Many use cases, both past and present, focus on penetration levels and help identify the capabilities of smart inverters, power electronic devices or other mechanical devices. Such testing allows for the development of standards based on factual results and further allows engineers to become comfortable with a rapidly evolving electric grid. This type of testing guides engineers, operators and others on how to integrate more Distributed Energy Resource (DER) devices while maintaining an efficient and reliable grid.

Physical Description:

The ITF will be expanded, new equipment purchased and additional computing resources.

Project Justification:

To continue to support safe and reliable deployment of advanced technologies driven by state policy and consumer adoption, the ITF must expand its testing facility. Maintaining a collaborate environment consistent with industry trends and driving industry standards SDG&E's ITF must adapt, develop and retain knowledge to meet the evolving electric grid. As more DERs are installed on the electric grid, dynamic modeling becomes more important. The ITF provide supports this type of real time simulation.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17245.0
Category:	J. DER INTEGRATION
Category-Sub:	7. ITF-INTEGRATED TEST FACILITY
Workpaper Group:	172450 - ITF-INTEGRATED TEST FACILITY

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17245.0
Category: J. DER INTEGRATION
Category-Sub: 7. ITF-INTEGRATED TEST FACILITY
Workpaper Group: 172450 - ITF-INTEGRATED TEST FACILITY

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	173	350	0	173	350	0
Non-Labor	Zero-Based	0	0	0	350	700	0	350	700	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**523**	**1,050**	**0**	**523**	**1,050**	**0**
FTE	Zero-Based	0.0	0.0	0.0	1.7	3.5	0.0	1.7	3.5	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17245.0
Category: J. DER INTEGRATION
Category-Sub: 7. ITF-INTEGRATED TEST FACILITY
Workpaper Group: 172450 - ITF-INTEGRATED TEST FACILITY

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17245.0
Category: J. DER INTEGRATION
Category-Sub: 7. ITF-INTEGRATED TEST FACILITY
Workpaper Group: 172450 - ITF-INTEGRATED TEST FACILITY

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 172450

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17245.0
Category:	J. DER INTEGRATION
Category-Sub:	7. ITF-INTEGRATED TEST FACILITY
Workpaper Group:	172450 - ITF-INTEGRATED TEST FACILITY
Workpaper Detail:	172450.001 - ITF-INTEGRATED TEST FACILITY
In-Service Date:	10/31/2018

Description:

ITF-INTEGRATED TEST FACILITY

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	173	350	0
Non-Labor	350	700	0
NSE	0	0	0
Total	**523**	**1,050**	**0**
FTE	1.7	3.5	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
172460 - BORREGO MICROGRID 3.0

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17246.0
Category: J. DER INTEGRATION
Category-Sub: 8. BORREGO MICROGRID 3.0
Workpaper Group: 172460 - BORREGO MICROGRID 3.0

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	69	1,730	0
Non-Labor	Zero-Based	0	0	0	0	0	140	3,500	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**209**	**5,230**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.7	17.3	0.0

Business Purpose:

The Borrego Springs Microgrid is experiencing major improvements through the Borrego Springs Microgrid Enhancements project, which maximizes renewable energy integration through advanced control systems that allow for remote operation. As microgrids become more prevalent, the need to understand how to operate and integrate them with larger grids and incorporate multiple technologies will be paramount. Furthermore, due to the dynamics of distribution load and DERs the need to develop a microgrid that is scalable will need to be understood and tested. By increasing the amount of energy storage and photovoltaic (PV)resources, the Borrego Microgrid can operate from 100% renewable energy.

Physical Description:

This project will install 12MW of solar and 150MWh of energy storage to support a local renewable generation portfolio of 100%, while operating in island mode, will increase grid resiliency for the entire Borrego Springs community, and demonstrate low inertia Microgrid control technologies.

Project Justification:

The project will allow the Borrego Microgrid to operate with 100% renewables while in island configuration, and this project will also support up to 300% of renewable capacity when operating in parallel with the electric grid.
The advanced functionality will support PV smoothing, and voltage control, which help enable DERs to maintain reliability of the microgrid.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17246.0
Category:	J. DER INTEGRATION
Category-Sub:	8. BORREGO MICROGRID 3.0
Workpaper Group:	172460 - BORREGO MICROGRID 3.0

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17246.0
Category: J. DER INTEGRATION
Category-Sub: 8. BORREGO MICROGRID 3.0
Workpaper Group: 172460 - BORREGO MICROGRID 3.0

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	69	1,730	0	69	1,730	0
Non-Labor	Zero-Based	0	0	0	140	3,500	0	140	3,500	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**209**	**5,230**	**0**	**209**	**5,230**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.7	17.3	0.0	0.7	17.3	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17246.0
Category: J. DER INTEGRATION
Category-Sub: 8. BORREGO MICROGRID 3.0
Workpaper Group: 172460 - BORREGO MICROGRID 3.0

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17246.0
Category: J. DER INTEGRATION
Category-Sub: 8. BORREGO MICROGRID 3.0
Workpaper Group: 172460 - BORREGO MICROGRID 3.0

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 172460

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17246.0
Category: J. DER INTEGRATION
Category-Sub: 8. BORREGO MICROGRID 3.0
Workpaper Group: 172460 - BORREGO MICROGRID 3.0
Workpaper Detail: 172460.001 - BORREGO MICROGRID 3.0

In-Service Date: 10/31/2018

Description:

BORREGO MICROGRID 3.0

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	69	1,730	0
Non-Labor	140	3,500	0
NSE	0	0	0
Total	**209**	**5,230**	**0**
FTE	0.7	17.3	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Workpaper: VARIOUS

Summary for Category: K. TRANSMISSION/FERC DRIVEN PROJECTS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	863	2,439	2,767	1,887
Non-Labor	9,116	29,744	54,809	48,231
NSE	0	0	0	0
Total	**9,979**	**32,183**	**57,576**	**50,118**
FTE	913.7	24.4	28.2	24.3
001000 ELEC TRANS LINE RELIABILITY PROJECTS				
Labor	145	100	100	100
Non-Labor	529	900	900	900
NSE	0	0	0	0
Total	**674**	**1,000**	**1,000**	**1,000**
FTE	0.9	1.0	1.0	1.0
10146A TL695 Talega Wood to Steel - RAMP				
Labor	0	24	223	0
Non-Labor	0	99	917	0
NSE	0	0	0	0
Total	**0**	**123**	**1,140**	**0**
FTE	0.0	0.2	2.2	0.0
10147A TL697 San Luis Rey Wood to Steel - RAMP				
Labor	0	38	454	0
Non-Labor	0	158	1,870	0
NSE	0	0	0	0
Total	**0**	**196**	**2,324**	**0**
FTE	0.0	0.4	4.6	0.0
10149A TL6912 Wood to Steel Pole Replacement - RAMP				
Labor	0	13	48	0
Non-Labor	0	53	197	0
NSE	0	0	0	0
Total	**0**	**66**	**245**	**0**
FTE	0.0	0.1	0.5	0.0
11126A TL663 Mission To Kearny Reconducto				
Labor	0	0	173	0
Non-Labor	0	0	0	0
NSE	0	0	0	0
Total	**0**	**0**	**173**	**0**
FTE	0.0	0.0	1.7	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
111330 TL664-WOOD TO STEEL				
Labor	0	35	0	0
Non-Labor	0	270	0	0
NSE	0	0	0	0
Total	**0**	**305**	**0**	**0**
FTE	0.0	0.3	0.0	0.0
121370 TL6916-WOOD TO STEEL				
Labor	0	0	0	58
Non-Labor	0	0	0	200
NSE	0	0	0	0
Total	**0**	**0**	**0**	**258**
FTE	0.0	0.0	0.0	6.0
12149A TL694 Wood To Steel				
Labor	0	0	0	87
Non-Labor	0	0	0	675
NSE	0	0	0	0
Total	**0**	**0**	**0**	**762**
FTE	0.0	0.0	0.0	0.9
13130A TL674 Loop-in				
Labor	0	3	3	483
Non-Labor	0	15	15	1,983
NSE	0	0	0	0
Total	**0**	**18**	**18**	**2,466**
FTE	0.0	0.1	0.1	4.8
141400 TL698 WOOD TO STEEL PROJECT				
Labor	0	0	87	87
Non-Labor	0	0	675	675
NSE	0	0	0	0
Total	**0**	**0**	**762**	**762**
FTE	0.0	0.0	0.9	0.9
001030 TRANSMISSION SUBSTATION RELIABILITY				
Labor	0	49	49	49
Non-Labor	0	50	50	50
NSE	0	0	0	0
Total	**0**	**99**	**99**	**99**
FTE	0.0	0.5	0.5	0.5
162540 DER Integration				
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.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
172470 SUBSTATION RELAY MODERNIZATION				
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
061290 ORANGE COUNTY LONG RANGE PLAN				
Labor	0	59	107	93
Non-Labor	0	873	7,538	4,252
NSE	0	0	0	0
Total	**0**	**932**	**7,645**	**4,345**
FTE	0.0	0.6	1.1	0.9
071440 FIBER OPTIC FOR RELAY PROTECT & TELECOM				
Labor	1	148	148	148
Non-Labor	69	243	243	243
NSE	0	0	0	0
Total	**70**	**391**	**391**	**391**
FTE	0.0	1.5	1.5	1.5
081650 Cleveland National Forest Power Line Replacement Projects - RAMP				
Labor	278	1,210	781	782
Non-Labor	6,898	24,945	38,428	39,253
NSE	0	0	0	0
Total	**7,176**	**26,155**	**39,209**	**40,035**
FTE	909.4	12.1	7.8	7.8
091370 TL649 Otay-San Ysidro-Border SW Pole Repl				
Labor	0	78	158	0
Non-Labor	0	334	696	0
NSE	0	0	0	0
Total	**0**	**412**	**854**	**0**
FTE	0.0	0.8	1.6	0.0
09153A TL676 Mission to Mesa Heights Reconductor				
Labor	0	115	404	0
Non-Labor	0	900	3,150	0
NSE	0	0	0	0
Total	**0**	**1,015**	**3,554**	**0**
FTE	0.0	1.2	4.4	0.0
101350 Los Coches Substation 138/69kV Rebuild				
Labor	439	554	0	0
Non-Labor	1,620	849	0	0
NSE	0	0	0	0
Total	**2,059**	**1,403**	**0**	**0**
FTE	3.4	5.5	0.0	0.0

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
10144A TL691 Avo-Mon Wood to Steel - RAMP				
Labor	0	13	32	0
Non-Labor	0	55	130	0
NSE	0	0	0	0
Total	**0**	**68**	**162**	**0**
FTE	0.0	0.1	0.3	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
001000 - ELEC TRANS LINE RELIABILITY PROJECTS

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00100.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 1. ELEC TRANS LINE RELIABILITY PROJECTS
Workpaper Group: 001000 - ELEC TRANS LINE RELIABILITY 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	11	21	15	49	145	100	100	100
Non-Labor	Zero-Based	713	343	167	717	529	900	900	900
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**724**	**364**	**182**	**766**	**674**	**1,000**	**1,000**	**1,000**
FTE	Zero-Based	0.0	0.1	0.1	0.3	0.9	1.0	1.0	1.0

Business Purpose:

To meet SDGE's obligation to serve and the safety requirements promulgated by CPUC G.O 95, A.B. 1890, A.B. 1017, etc., this project provides funds for several purposes, such as:
1. To restore degraded transmission facilities.
2. To repair the system in the vent of disaster such as storm or fire
3. To cover small (under $750,000) projects for restoring the system which are not identified during the annual review study process.
4. To provide funding for a pole restoration program for in-service transmission wood poles.
5. To provide funding for annual NERC and Tie Lines Assessments (TLA)

Physical Description:

Transmission Projects Under $750K:
Comply with SDG&E's Obligation to serve and meet safety requirements set by General Orders and other regulations.

Project Justification:

This budget covers transmission projects under $750K . The majority of the activities that fall under this blanket budget are necessary to comply with Federal, State , and Local regulations. Activities include poles that need to be replaced due to deterioration or calculated overloads, and capital repairs related to inspections (visual, infrared, LiDAR, etc.)

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00100.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	1. ELEC TRANS LINE RELIABILITY PROJECTS
Workpaper Group:	001000 - ELEC TRANS LINE RELIABILITY PROJECTS

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero-based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00100.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 1. ELEC TRANS LINE RELIABILITY PROJECTS
Workpaper Group: 001000 - ELEC TRANS LINE RELIABILITY PROJECTS

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	100	100	100	0	0	0	100	100	100
Non-Labor	Zero-Based	900	900	900	0	0	0	900	900	900
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**1,000**	**1,000**	**1,000**	**0**	**0**	**0**	**1,000**	**1,000**	**1,000**
FTE	Zero-Based	1.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00100.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 1. ELEC TRANS LINE RELIABILITY PROJECTS
Workpaper Group: 001000 - ELEC TRANS LINE RELIABILITY PROJECTS

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	8	17	12	42	72
Non-Labor	643	320	161	708	601
NSE	0	0	0	0	0
Total	**652**	**337**	**173**	**749**	**673**
FTE	0.0	0.1	0.1	0.3	0.4
Adjustments (Nominal $) **					
Labor	0	0	0	0	53
Non-Labor	0	0	0	0	-72
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**-20**
FTE	0.0	0.0	0.0	0.0	0.4
Recorded-Adjusted (Nominal $)					
Labor	8	17	12	42	124
Non-Labor	643	320	161	708	529
NSE	0	0	0	0	0
Total	**652**	**337**	**173**	**749**	**653**
FTE	0.0	0.1	0.1	0.3	0.8
Vacation & Sick (Nominal $)					
Labor	1	3	2	6	21
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**1**	**3**	**2**	**6**	**21**
FTE	0.0	0.0	0.0	0.0	0.1
Escalation to 2016$					
Labor	1	1	1	1	0
Non-Labor	70	23	6	10	0
NSE	0	0	0	0	0
Total	**71**	**24**	**7**	**10**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	11	21	15	49	145
Non-Labor	713	343	167	717	529
NSE	0	0	0	0	0
Total	**724**	**364**	**182**	**766**	**674**
FTE	0.0	0.1	0.1	0.3	0.9

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00100.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 1. ELEC TRANS LINE RELIABILITY PROJECTS
Workpaper Group: 001000 - ELEC TRANS LINE RELIABILITY PROJECTS

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	0	0	0	0	53
Non-Labor	0	0	0	0	-72
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**-20**
FTE	0.0	0.0	0.0	0.0	0.4

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	53	-72	0	-20	0.4	EAMARE20161106144803333
Explanation:	Adjustment made to reflect actual 2016 spend through the month of Oct-16 and Nov-Dec Q3 Outlook						
2016 Total		53	-72	0	-20	0.4	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 001000

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00100.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	1. ELEC TRANS LINE RELIABILITY PROJECTS
Workpaper Group:	001000 - ELEC TRANS LINE RELIABILITY PROJECTS
Workpaper Detail:	001000.001 - ELEC TRANS LINE RELIABILITY PROJECTS
In-Service Date:	Not Applicable

Description:

This budget covers transmission projects under $750K . The majority of the activities that fall under this blanket budget are necessary to comply with Federal, State , and Local regulations. Activities include poles that need to be replaced due to deterioration or calculated overloads, and capital repairs related to inspections (visual, infrared, LiDAR, etc.)

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	100	100	100
Non-Labor	900	900	900
NSE	0	0	0
Total	**1,000**	**1,000**	**1,000**
FTE	1.0	1.0	1.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
001030 - TRANSMISSION SUBSTATION RELIABILITY

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00103.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 2. Transmission Substation Reliability
Workpaper Group: 001030 - TRANSMISSION SUBSTATION RELIABILITY

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	42	8	0	6	0	49	49	49
Non-Labor	5-YR Average	49	0	7	0	0	50	50	50
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**90**	**8**	**7**	**6**	**0**	**99**	**99**	**99**
FTE	5-YR Average	0.3	0.0	0.0	0.0	0.0	0.5	0.5	0.5

Business Purpose:

This project is for small changes to electrical transmission substation facilities. General project categories include:
1. Safety related improvements
2. Replacement of failed and/or obsolete equipment
3. Capital additions under $500,000.

Work authorized within this project is classified under the following accounts:
352 Structures & Improvements (Transmission)
353 Station Equipment (Transmission)
397 Communication Equipment (Transmission)

Physical Description:

This budget is required to maintain the reliability and integrity of transmission substations. The specific work required to meet safety requirements, replace obsolete or failed equipment, and make necessary small capital additions is based on requests from Engineering, Planning, Operations, and Maintenance groups.

Project Justification:

There are no alternatives to this budget if safety requirements are to be met, obsolete/failed equipment replacement is to continue, and necessary small capital additions are to be made.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00103.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	2. Transmission Substation Reliability
Workpaper Group:	001030 - TRANSMISSION SUBSTATION RELIABILITY

Forecast Methodology:

Labor - 5-YR Average

This forecast is based on historical activities as well as specific detailed cost estimates for forecasted work. This budget covers primarily reactive activities, with some smaller proactive activities, as required. Failures are hard to predict, so the proactive work is balanced with the reactive, depending on the number of failures within a given year.

Non-Labor - 5-YR Average

This forecast is based on historical activities as well as specific detailed cost estimates for forecasted work. This budget covers primarily reactive activities, with some smaller proactive activities, as required. Failures are hard to predict, so the proactive work is balanced with the reactive, depending on the number of failures within a given year.

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00103.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 2. Transmission Substation Reliability
Workpaper Group: 001030 - TRANSMISSION SUBSTATION RELIABILITY

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	11	11	11	38	38	38	49	49	49
Non-Labor	5-YR Average	11	11	11	39	39	39	50	50	50
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**22**	**22**	**22**	**77**	**77**	**77**	**99**	**99**	**99**
FTE	5-YR Average	0.1	0.1	0.1	0.4	0.4	0.4	0.5	0.5	0.5

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	38	39	0	77	0.4	ACREVOIS20161201114146163
Explanation:	This forecast is based on historical activities as well as specific detailed cost estimates for forecasted work.						
2017 Total		38	39	0	77	0.4	
2018	Other	38	39	0	77	0.4	ACREVOIS20161201114201800
Explanation:	This forecast is based on historical activities as well as specific detailed cost estimates for forecasted work.						
2018 Total		38	39	0	77	0.4	
2019	Other	38	39	0	77	0.4	ACREVOIS20161201114214190
Explanation:	This forecast is based on historical activities as well as specific detailed cost estimates for forecasted work.						
2019 Total		38	39	0	77	0.4	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00103.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 2. Transmission Substation Reliability
Workpaper Group: 001030 - TRANSMISSION SUBSTATION RELIABILITY

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	33	6	0	5	0
Non-Labor	44	0	7	0	0
NSE	0	0	0	0	0
Total	**77**	**6**	**7**	**5**	**0**
FTE	0.3	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	33	6	0	5	0
Non-Labor	44	0	7	0	0
NSE	0	0	0	0	0
Total	**77**	**6**	**7**	**5**	**0**
FTE	0.3	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	5	1	0	1	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**5**	**1**	**0**	**1**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	4	1	0	0	0
Non-Labor	5	0	0	0	0
NSE	0	0	0	0	0
Total	**9**	**1**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	42	8	0	6	0
Non-Labor	49	0	7	0	0
NSE	0	0	0	0	0
Total	**90**	**8**	**7**	**6**	**0**
FTE	0.3	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 00103.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 2. Transmission Substation Reliability
Workpaper Group: 001030 - TRANSMISSION SUBSTATION RELIABILITY

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 001030

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	00103.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	2. Transmission Substation Reliability
Workpaper Group:	001030 - TRANSMISSION SUBSTATION RELIABILITY
Workpaper Detail:	001030.001 - Transmission Substation Reliability
In-Service Date:	Not Applicable

Description:

This budget is required to maintain the reliability and integrity of transmission substations. The specific work required to meet safety requirements, replace obsolete or failed equipment, and make necessary small capital additions is based on requests from Engineering, Planning, Operations, and Maintenance groups.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	49	49	49
Non-Labor	50	50	50
NSE	0	0	0
Total	**99**	**99**	**99**
FTE	0.5	0.5	0.5

Note: Totals may include rounding differences.

Beginning of Workpaper Group
061290 - ORANGE COUNTY LONG RANGE PLAN

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06129.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 3. SOCRE
Workpaper Group: 061290 - ORANGE COUNTY LONG RANGE PLAN

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	384	0	0	0	0	59	107	93
Non-Labor	Zero-Based	2,253	0	-12	0	0	873	7,538	4,252
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**2,637**	**0**	**-12**	**0**	**0**	**932**	**7,645**	**4,345**
FTE	Zero-Based	3.1	0.0	0.0	0.0	0.0	0.6	1.1	0.9

Business Purpose:

Replace existing 138/12kV Capistrano Substation with a new 230/138/12kV Gas Insulated Substation; Replace an existing 138kV transmission line with two 230kV transmission lines to be primarily built in existing SDG&E rights of Way.

Physical Description:

To rebuild the existing Capistrano Substation, which is currently a 138/12kV distribution substation to a 230/138kV.
Remove TL13835 between Talega Substation and Capistrano Substation. Open TL23007 at Talega Substation and loop into Capistrano Substation two new 230kV TL's. Re-arrange 138kV TL's 13833, 138736, and 13812 bay positions at Talega to allow for the termination of TL13835 at Talega Substation.

Project Justification:

This project rebuilds aging infrastructure, adds new 230 kV source, and adds capacity to Orange County area.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06129.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	3. SOCRE
Workpaper Group:	061290 - ORANGE COUNTY LONG RANGE PLAN

Forecast Methodology:

Labor - Zero-Based

Zero Based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

Zero Based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06129.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 3. SOCRE
Workpaper Group: 061290 - ORANGE COUNTY LONG RANGE PLAN

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	59	107	93	0	0	0	59	107	93
Non-Labor	Zero-Based	873	7,538	4,252	0	0	0	873	7,538	4,252
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**932**	**7,645**	**4,345**	**0**	**0**	**0**	**932**	**7,645**	**4,345**
FTE	Zero-Based	0.6	1.1	0.9	0.0	0.0	0.0	0.6	1.1	0.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06129.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 3. SOCRE
Workpaper Group: 061290 - ORANGE COUNTY LONG RANGE PLAN

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	303	0	0	0	0
Non-Labor	2,032	0	-11	0	0
NSE	0	0	0	0	0
Total	**2,334**	**0**	**-11**	**0**	**0**
FTE	2.7	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	303	0	0	0	0
Non-Labor	2,032	0	-11	0	0
NSE	0	0	0	0	0
Total	**2,334**	**0**	**-11**	**0**	**0**
FTE	2.7	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	44	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**44**	**0**	**0**	**0**	**0**
FTE	0.4	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	38	0	0	0	0
Non-Labor	221	0	0	0	0
NSE	0	0	0	0	0
Total	**259**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	384	0	0	0	0
Non-Labor	2,253	0	-12	0	0
NSE	0	0	0	0	0
Total	**2,637**	**0**	**-12**	**0**	**0**
FTE	3.1	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 06129.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 3. SOCRE
Workpaper Group: 061290 - ORANGE COUNTY LONG RANGE PLAN

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 061290

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	06129.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	3. SOCRE
Workpaper Group:	061290 - ORANGE COUNTY LONG RANGE PLAN
Workpaper Detail:	061290.001 - SOCRE
In-Service Date:	11/30/2019

Description:

RAMP - To rebuild the existing Capistrano Substation which is currently a 138/12kV distribution substation to a 230/138kV. Remove TL13835 between Talega Substation and Capistrano Substation. Open TL23007 at Talega Substation and loop into Capistrano Substation two new 230kV TL's. Re-arrange 138kV TL's 13833, 138736, and 13812 bay positions at Talega to allow for the termination of TL13835 at Talega Substation.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	59	107	93
Non-Labor	873	7,538	4,252
NSE	0	0	0
Total	**932**	**7,645**	**4,345**
FTE	0.6	1.1	0.9

Note: Totals may include rounding differences.

Beginning of Workpaper Group
071440 - FIBER OPTIC FOR RELAY PROTECT & TELECOM

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 07144.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 4. FIBER OPTIC FOR RELAY PROTECT & TELECOM
Workpaper Group: 071440 - FIBER OPTIC FOR RELAY PROTECT & TELECOM

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	4	6	6	10	1	148	148	148
Non-Labor	5-YR Average	516	63	25	355	69	243	243	243
NSE	5-YR Average	0	0	0	0	0	0	0	0
Total		**520**	**69**	**31**	**364**	**71**	**391**	**391**	**391**
FTE	5-YR Average	0.0	0.0	0.0	0.0	0.0	1.5	1.5	1.5

Business Purpose:

This project provides funds for the installation, upgrade, and expansion of SDG&E's Fiber Optic communication system for Control & Protection of Transmission and Distribution lines, and automation. Besides Control and Protection, secure fiber optic communication is required for transporting large amount of data at high speed for Condition Based Maintenance (CBM), Wide Area Measurement and Control (Synchrophasors/Phasor Measurement), Op/Ex 20/20, Video Security and Surveillance, Smart Grid and Telecommunication.

Currently, many substations use Telephone Company lease circuits and copper wire for protective relaying, and SCADA. These circuits are old, not reliable, and don't meet communication requirements for new digital protective relay systems that are being installed.

The new fiber routes will provide communications media diversity for protective relaying throughout the SDG&E service territory. System protection is a key function in the electrical power grid. It is the key to guard against conditions that would severely harm the electric system infrastructure and cause extended outages. Highly reliable and available communications links are essential to ensuring protective relaying is functional in the event of a system fault.

Physical Description:

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	07144.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	4. FIBER OPTIC FOR RELAY PROTECT & TELECOM
Workpaper Group:	071440 - FIBER OPTIC FOR RELAY PROTECT & TELECOM

This project will complete fiber cable routes between 60 substations attaching nearly 550 miles of new fiber to existing transmission structures. Fiber routes to be built are divided into 27 projects to be completed over a 5 year period and will be installed in priority order as developed by System Protection Engineering and Telecommunications.

Installations will primarily utilize transmission line right of ways and facilities. Engineering will utilize standards and engineering designs developed from previous fiber optic cable installations. Due to manpower constraints and to meet schedule requirements, Engineering will utilize proven outside engineering contractors to design fiber optic installations. Transmission Engineering will provide design review and coordination of material procurement, engineering, and construction.

Most of the high dollar fiber optic cable will be procured through bidding process. Two types of fiber optic cable will be utilized:

- All Dielectric Self Supporting (ADSS), mainly used for wood pole attachments, and underground installations
- Optical Ground Wire (OPGW), replaces static ground wire on steel poles and towers.

All line construction activities to be bid. Installations may require replacement of existing wood poles to meet loading or GO-95 clearance requirements. Some installations will require transmission line outages for construction. Environmental surveys will need to be completed for construction activities.

Project Justification:

The project when completed will provide a self-healing network to carry multi-gigabit data on demand. Our microwave network will also be upgraded to, or be replaced with higher bandwidth (622 Mbps or higher) system, which is key to real-time applications. Create a solid backbone of Synchronous Optical NETwork (SONET) consisting of fiber optic and high speed digital microwave network.

Modern protection relays require high-speed, dependable, and secure communication for protection and control. Presently, SDG&E's existing communication infrastructure is inadequate for protection of transmission lines, compromising protection dependability and security. SDG&E is lagging behind the industry in providing the quality of communication necessary to meet the demands of today's protection equipment.

This project will install Fiber Optic communication on all 138kV and above transmission lines in the next 3 years and convert major 69 kV system to fiber in 5 years for safe grid operation. It will reduce single-use telecom infrastructures. It will position SDG&E for future automation application, Condition Based Maintenance (CBM), Smart Meter (AMI), Smart Grid, and Op/Ex 20/20.

No CPUC permitting will be required if fiber cable is only used for internal company data communications and protective relaying purposes, and limited fiber count is used.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	07144.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	4. FIBER OPTIC FOR RELAY PROTECT & TELECOM
Workpaper Group:	071440 - FIBER OPTIC FOR RELAY PROTECT & TELECOM

Forecast Methodology:

Labor - 5-YR Average

Five Year Average

Non-Labor - 5-YR Average

Five Year Average

NSE - 5-YR Average

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 07144.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 4. FIBER OPTIC FOR RELAY PROTECT & TELECOM
Workpaper Group: 071440 - FIBER OPTIC FOR RELAY PROTECT & TELECOM

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	5	5	5	143	143	143	148	148	148
Non-Labor	5-YR Average	205	205	205	38	38	38	243	243	243
NSE	5-YR Average	0	0	0	0	0	0	0	0	0
Total		**210**	**210**	**210**	**181**	**181**	**181**	**391**	**391**	**391**
FTE	5-YR Average	0.0	0.0	0.0	1.5	1.5	1.5	1.5	1.5	1.5

Forecast Adjustment Details

Year	Adj Group	Labor	NLbr	NSE	Total	FTE	RefID
2017	Other	143	37	0	180	1.5	LPINEDA20161130171637863
Explanation:	adjusted for projected spend						
2017 Total		143	37	0	180	1.5	
2018	Other	143	37	0	180	1.5	ACREVOIS20161203132904900
Explanation:	adjusted for projected spend						
2018 Total		143	37	0	180	1.5	
2019	Other	143	37	0	180	1.5	LPINEDA20161130173049030
Explanation:	adjusted for projected spend						
2019 Total		143	37	0	180	1.5	

Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 07144.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 4. FIBER OPTIC FOR RELAY PROTECT & TELECOM
Workpaper Group: 071440 - FIBER OPTIC FOR RELAY PROTECT & TELECOM

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	3	5	5	8	1
Non-Labor	465	59	24	350	69
NSE	0	0	0	0	0
Total	**468**	**64**	**29**	**358**	**70**
FTE	0.0	0.0	0.0	0.0	0.0
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	3	5	5	8	1
Non-Labor	465	59	24	350	69
NSE	0	0	0	0	0
Total	**468**	**64**	**29**	**358**	**70**
FTE	0.0	0.0	0.0	0.0	0.0
Vacation & Sick (Nominal $)					
Labor	0	1	1	1	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**1**	**1**	**1**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	51	4	1	5	0
NSE	0	0	0	0	0
Total	**51**	**5**	**1**	**5**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	4	6	6	10	1
Non-Labor	516	63	25	355	69
NSE	0	0	0	0	0
Total	**520**	**69**	**31**	**364**	**71**
FTE	0.0	0.0	0.0	0.0	0.0

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 07144.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 4. FIBER OPTIC FOR RELAY PROTECT & TELECOM
Workpaper Group: 071440 - FIBER OPTIC FOR RELAY PROTECT & TELECOM

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 071440

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 07144.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 4. FIBER OPTIC FOR RELAY PROTECT & TELECOM
Workpaper Group: 071440 - FIBER OPTIC FOR RELAY PROTECT & TELECOM
Workpaper Detail: 071440.001 - FIBER OPTIC FOR RELAY PROTECT & TELECOM

In-Service Date: Not Applicable

Description:

This project will complete fiber cable routes between 60 substations attaching nearly 550 miles of new fiber to existing transmission structures. Fiber routes to be built are divided into 27 projects to be completed over a 5 year period and will be installed in priority order as developed by System Protection Engineering and Telecommunications.

Installations will primarily utilize transmission line right of ways and facilities. Engineering will utilize standards and engineering designs developed from previous fiber optic cable installations. Due to manpower constraints and to meet schedule requirements, Engineering will utilize proven outside engineering contractors to design fiber optic installations. Transmission Engineering will provide design review and coordination of material procurement, engineering, and construction.

Most of the high dollar fiber optic cable will be procured through bidding process. Two types of fiber optic cable will be utilized:

- All Dielectric Self Supporting (ADSS), mainly used for wood pole attachments, and underground installations
- Optical Ground Wire (OPGW), replaces static ground wire on steel poles and towers.

All line construction activities to be bid. Installations may require replacement of existing wood poles to meet loading or GO-95 clearance requirements. Some installations will require transmission line outages for construction. Environmental surveys will need to be completed for construction activities.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	148	148	148
Non-Labor	243	243	243
NSE	0	0	0
Total	**391**	**391**	**391**
FTE	1.5	1.5	1.5

Note: Totals may include rounding differences.

Beginning of Workpaper Group
081650 - Cleveland National Forest Power Line Replacement Projects - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08165.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 5. CNF 625B / 629E
Workpaper Group: 081650 - Cleveland National Forest Power Line Replacement Projects - RAMP

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	28	100	278	1,210	781	782
Non-Labor	Zero-Based	0	0	72	268	6,898	24,945	38,428	39,253
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**100**	**368**	**7,176**	**26,155**	**39,209**	**40,035**
FTE	Zero-Based	0.0	0.0	273.6	585.8	909.4	12.1	7.8	7.8

Business Purpose:

The project includes the replacement of five existing 69 kV power lines and seven 12 kV distribution circuits located within and outside of the Cleaveland National Forest. Additionally, a 19 mile portion of 69kV line will be removed from service. Power line replacement will primarily include fire hardening of the facilities by replacing wood poles with steel poles and placing some portions of the 12kV circuits underground.

Physical Description:

The project includes the replacement of five existing 69 kV power lines and seven 12 kV distribution circuits located within and outside of the Cleaveland National Forest. Additionally, a 19 mile portion of 69kV line will be removed from service. Power line replacement will primarily include fire hardening of the facilities by replacing wood poles with steel poles and placing some portions of the 12kV circuits underground.

Project Justification:

The project establishes a Master Special Use Permit (MSUP) to replace over 70 expired permits in the Cleveland National Forest. The project will also enhance system reliability in Fire Threat Zone and the High Risk Fire Area of the SDG&E service territory via wood to steel pole conversion and other fire hardening measures.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08165.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 5. CNF 625B / 629E
Workpaper Group: 081650 - Cleveland National Forest Power Line Replacement Projects - RAMP

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	1,210	781	782	0	0	0	1,210	781	782
Non-Labor	Zero-Based	24,945	38,428	39,253	0	0	0	24,945	38,428	39,253
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**26,155**	**39,209**	**40,035**	**0**	**0**	**0**	**26,155**	**39,209**	**40,035**
FTE	Zero-Based	12.1	7.8	7.8	0.0	0.0	0.0	12.1	7.8	7.8

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08165.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 5. CNF 625B / 629E
Workpaper Group: 081650 - Cleveland National Forest Power Line Replacement Projects - RAMP

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	0	36	162
Non-Labor	0	0	-8	16	1,612
NSE	0	0	0	0	0
Total	**0**	**0**	**-8**	**51**	**1,773**
FTE	0.0	0.0	0.0	0.3	1.3
Adjustments (Nominal $) **					
Labor	0	0	23	50	77
Non-Labor	0	0	78	249	5,286
NSE	0	0	0	0	0
Total	**0**	**0**	**101**	**299**	**5,363**
FTE	0.0	0.0	232.0	498.3	768.3
Recorded-Adjusted (Nominal $)					
Labor	0	0	23	86	238
Non-Labor	0	0	69	264	6,898
NSE	0	0	0	0	0
Total	**0**	**0**	**92**	**350**	**7,136**
FTE	0.0	0.0	232.0	498.6	769.6
Vacation & Sick (Nominal $)					
Labor	0	0	4	13	40
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**4**	**13**	**40**
FTE	0.0	0.0	41.6	87.2	139.8
Escalation to 2016$					
Labor	0	0	1	1	0
Non-Labor	0	0	3	4	0
NSE	0	0	0	0	0
Total	**0**	**0**	**4**	**5**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	28	100	278
Non-Labor	0	0	72	268	6,898
NSE	0	0	0	0	0
Total	**0**	**0**	**100**	**368**	**7,176**
FTE	0.0	0.0	273.6	585.8	909.4

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08165.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 5. CNF 625B / 629E
Workpaper Group: 081650 - Cleveland National Forest Power Line Replacement Projects - RAMP

Summary of Adjustments to Recorded:

In Nominal $(000)					
Years	**2012**	**2013**	**2014**	**2015**	**2016**
Labor	0	0	23	50	77
Non-Labor	0	0	78	249	5,286
NSE	0	0	0	0	0
Total	**0**	**0**	**101**	**299**	**5,363**
FTE	0.0	0.0	232.0	498.3	768.3

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	Other	23	78	0	101	232.0	EAMARE20170831162921563
Explanation:	Adjustment for historical costs inadvertently excluded in the original accounting history extract						
2014 Total		23	78	0	101	232.0	
2015	Other	50	249	0	299	498.3	EAMARE20170831162606543
Explanation:	Adjustment for historical costs inadvertently excluded in the original accounting history extract						
2015 Total		50	249	0	299	498.3	
2016	Other	77	5,286	0	5,363	768.3	EAMARE20170831162745763
Explanation:	Adjustment for historical costs inadvertently excluded in the original accounting history extract						
2016 Total		77	5,286	0	5,363	768.3	

Note: Totals may include rounding differences.

Beginning of Workpaper Sub Details for
Workpaper Group 081650

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.001 - RAMP - Incremental - CNF 625B / 629E
In-Service Date:	07/31/2017

Description:

CNF 625B / 629E

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	58	0	0
Non-Labor	1,171	0	0
NSE	0	0	0
Total	**1,229**	**0**	**0**
FTE	0.6	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.001 - RAMP - Incremental - CNF 625B / 629E

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: CNF - Distribution

Program Description: Consolidating over 70 individual Special Use Permits for existing electric facilities on National Forest lands into one Master Special Use Permit and fire hardening (wood to steel pole replacement and undergrounding) of 5 transmission and 7 distribution lines

Risk/Mitigation:

Risk: SDG&E Wildfires

Mitigation: System Hardening

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	43,812	58,704	60,949
High	57,156	75,815	79,034

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 1800

Explanation: This item is all related to RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08165.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 5. CNF 625B / 629E
Workpaper Group: 081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail: 081650.002 - RAMP - Incremental CNF 625D

In-Service Date: 10/31/2018

Description:

CNF 625D

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1	21	0
Non-Labor	842	2,074	0
NSE	0	0	0
Total	**843**	**2,095**	**0**
FTE	0.1	0.2	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.002 - RAMP - Incremental CNF 625D

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: see input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: see input detail 1

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.004 - RAMP - Incremental CNF-629A
In-Service Date:	10/31/2018

Description:

CNF-629A

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	3	21	0
Non-Labor	1,935	7,508	0
NSE	0	0	0
Total	**1,938**	**7,529**	**0**
FTE	0.1	0.2	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.004 - RAMP - Incremental CNF-629A

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.005 - RAMP - Incremental CNF-682
In-Service Date:	09/30/2018

Description:

CNF-682

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	15	15	0
Non-Labor	3,038	3,371	0
NSE	0	0	0
Total	**3,053**	**3,386**	**0**
FTE	0.1	0.1	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.005 - RAMP - Incremental CNF-682

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: See input detail 1

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.006 - RAMP - Incremental CNF-6931
In-Service Date:	10/31/2017

Description:

CNF-6931

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	11	0	0
Non-Labor	1,874	0	0
NSE	0	0	0
Total	**1,885**	**0**	**0**
FTE	0.1	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.006 - RAMP - Incremental CNF-6931

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: See input detail 1

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.007 - RAMP - Incremental CNF-78
In-Service Date:	09/30/2017

Description:

CNF-78

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	572	0	0
Non-Labor	1,168	0	0
NSE	0	0	0
Total	**1,740**	**0**	**0**
FTE	5.7	0.0	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.007 - RAMP - Incremental CNF-78

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.009 - RAMP - Incremental CNF-79B (OH RFS)
In-Service Date:	08/31/2019

Description:

CNF-79B (OH RFS)

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	40	121
Non-Labor	1,639	2,342	11,920
NSE	0	0	0
Total	**1,639**	**2,382**	**12,041**
FTE	0.0	0.4	1.2

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.009 - RAMP - Incremental CNF-79B (OH RFS)

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: See input detail 1

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.010 - RAMP - Incremental CNF-C222
In-Service Date:	08/31/2019

Description:

CNF-C222

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1	0	114
Non-Labor	740	256	8,360
NSE	0	0	0
Total	**741**	**256**	**8,474**
FTE	0.1	0.0	1.2

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.010 - RAMP - Incremental CNF-C222

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: See input detail 1

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.011 - RAMP - Incremental CNF-157
In-Service Date:	04/30/2018

Description:

CNF-157

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	77	76	0
Non-Labor	3,747	4,219	0
NSE	0	0	0
Total	**3,824**	**4,295**	**0**
FTE	0.8	0.8	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.011 - RAMP - Incremental CNF-157

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: See input detail 1

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08165.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 5. CNF 625B / 629E
Workpaper Group: 081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail: 081650.013 - RAMP - Incremental CNF-C442

In-Service Date: 05/31/2018

Description:

CNF-C442

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	34	69	0
Non-Labor	6,097	8,401	0
NSE	0	0	0
Total	**6,131**	**8,470**	**0**
FTE	0.3	0.7	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.013 - RAMP - Incremental CNF-C442

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: See input detail 1

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.014 - RAMP - Incremental CNF-449/625C/629C/629D
In-Service Date:	08/31/2019

Description:

CNF-449/625C/629C/629D

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	138	142
Non-Labor	1,254	9,469	18,398
NSE	0	0	0
Total	**1,254**	**9,607**	**18,540**
FTE	0.0	1.4	1.4

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.014 - RAMP - Incremental CNF-449/625C/629C/629D

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: See input detail 1

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 08165.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 5. CNF 625B / 629E
Workpaper Group: 081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail: 081650.015 - RAMP - Incremental CNF-PMO

In-Service Date: 12/31/2019

Description:

CNF-PMO

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	438	401	405
Non-Labor	1,440	788	575
NSE	0	0	0
Total	**1,878**	**1,189**	**980**
FTE	4.2	4.0	4.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	08165.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	5. CNF 625B / 629E
Workpaper Group:	081650 - Cleveland National Forest Power Line Replacement Projects - RAMP
Workpaper Detail:	081650.015 - RAMP - Incremental CNF-PMO

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: See input detail 1

Program Description: See input detail 1

Risk/Mitigation:

Risk: See input detail 1

Mitigation: See input detail 1

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: See input detail 1

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: See input detail 1

Beginning of Workpaper Group
091370 - TL649 Otay-San Ysidro-Border SW Pole Repl

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 09137.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 6. TL649 Otay-San Ysidro-Border SW Pole Replace
Workpaper Group: 091370 - TL649 Otay-San Ysidro-Border SW Pole Repl

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	78	158	0
Non-Labor	Zero-Based	0	0	0	0	0	334	696	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**412**	**854**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.8	1.6	0.0

Business Purpose:

To reinforce OH infrastructure in the back country.

Physical Description:

Rebuild TL649 with steel/wood (SW) equivalent structures for a distance of approximately 9 miles.

Project Justification:

As a result of the fires in San Diego county; Transmission line outages due to fires have serious impacts on utility electric system reliability and the resulting loss of electric service can debilitate emergency services and our customer's abilities to cope during the fire emergency. In an effort to reduce future damage and enhance the line's fire resistance, approximately 10 miles of wood poles on TL6910 within high risk fire areas has been targeting for replacement with equivalent steel poles.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	09137.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	6. TL649 Otay-San Ysidro-Border SW Pole Replace
Workpaper Group:	091370 - TL649 Otay-San Ysidro-Border SW Pole Repl

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 09137.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 6. TL649 Otay-San Ysidro-Border SW Pole Replace
Workpaper Group: 091370 - TL649 Otay-San Ysidro-Border SW Pole Repl

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	78	158	0	78	158	0
Non-Labor	Zero-Based	0	0	0	334	696	0	334	696	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**412**	**854**	**0**	**412**	**854**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.8	1.6	0.0	0.8	1.6	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 09137.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 6. TL649 Otay-San Ysidro-Border SW Pole Replace
Workpaper Group: 091370 - TL649 Otay-San Ysidro-Border SW Pole Repl

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 09137.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 6. TL649 Otay-San Ysidro-Border SW Pole Replace
Workpaper Group: 091370 - TL649 Otay-San Ysidro-Border SW Pole Repl

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 091370

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	09137.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	6. TL649 Otay-San Ysidro-Border SW Pole Replace
Workpaper Group:	091370 - TL649 Otay-San Ysidro-Border SW Pole Repl
Workpaper Detail:	091370.001 - RAMP - Incremental TL649 Otay-San Ysidro-Border SW Pole Replace
In-Service Date:	11/30/2018

Description:

Rebuild TL649 with steel/wood (SW) equivalent structures for a distance of approximately 9 miles.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	78	158	0
Non-Labor	334	696	0
NSE	0	0	0
Total	**412**	**854**	**0**
FTE	0.8	1.6	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	09137.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	6. TL649 Otay-San Ysidro-Border SW Pole Replace
Workpaper Group:	091370 - TL649 Otay-San Ysidro-Border SW Pole Repl
Workpaper Detail:	091370.001 - RAMP - Incremental TL649 Otay-San Ysidro-Border SW Pole Replace

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: MP Wood to Steel - Distrib

Program Description: Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability

Risk/Mitigation:

Risk: SDG&E Wildfires

Mitigation: Inspection, Repair, Maintenance & Replacement Programs

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: Hi Low RAMP items are under BC 10144

Beginning of Workpaper Group
09153A - TL676 Mission to Mesa Heights Reconductor

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 09153.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 7. TL676 Mission to Mesa Heights Reconductor
Workpaper Group: 09153A - TL676 Mission to Mesa Heights Reconductor

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	115	404	0
Non-Labor	Zero-Based	0	0	0	0	0	900	3,150	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**1,015**	**3,554**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.2	4.4	0.0

Business Purpose:

(Phase 1 Preliminary Engineering) Construction of this project will provide a long term wires mitigation for the identified NERC CAT B reliability criteria. The non wires options of depentling on the Kearny gas turbines, though effective short term, provide loading relief only for the few remaining years they are available to operate.

Physical Description:

The scope of the project includes reconductoring 4.3 miles of 2 636 ACSR/AW to 2 636 ACSS, replacing all 93 existing wood poles with wood equivalent steel poles, removing the existing cable pole, constructing a new double circuit trench, and erecting a new double circuit steel cable pole in the franchise position. This scope of work will provide a line capable of a new minimum continuous rating of 204MVA. In addition, Mesa Heights substation will require replacement of two disconnect switches from 1200A to 2000A and the rebuilding of a portion of the south bus from 2 inch aluminum to 3.5 inch aluminum. No work is required at Mission substation. Distribution scope typically consists of transfers for the pole replacements though segments of redconductoing have been identified and added to the scope.

Project Justification:

Beginning in 2015, NERC Category B reliability criteria indications occur as a result of overloads on TL676 (MS MSH). They are caused by the outage of TL663 (Kearny Mission). In addition, beginning in 2010 and throughout the study window, Category C indications occur during outage simulations for the Kearny 69kV east bus and the Mission 69kV north bus. The existing limitations are caused by the 1750MCM AL UG cable and on the bundled 336 ACSR/AW overhead conductor. NERC Category A base case indications also begin to occur by 2020.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	09153.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	7. TL676 Mission to Mesa Heights Reconductor
Workpaper Group:	09153A - TL676 Mission to Mesa Heights Reconductor

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actual costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 09153A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	09153.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	7. TL676 Mission to Mesa Heights Reconductor
Workpaper Group:	09153A - TL676 Mission to Mesa Heights Reconductor
Workpaper Detail:	09153A.001 - TL676 Mission to Mesa Heights Reconductor
In-Service Date:	11/30/2018

Description:

The scope of the project includes reconductoring 4.3 miles of 2 636 ACSR/AW to 2 636 ACSS, replacing all 93 existing wood poles with wood equivalent steel poles, removing the existing cable pole, constructing a new double circuit trench, and erecting a new double circuit steel cable pole in the franchise position. This scope of work will provide a line capable of a new minimum continuous rating of 204MVA. In addition, Mesa Heights substation will require replacement of two disconnect switches from 1200A to 2000A and the rebuilding of a portion of the south bus from 2 inch aluminum to 3.5 inch aluminum. No work is required at Mission substation. Distribution scope typically consists of transfers for the pole replacements though segments of redconductoing have been identified and added to the scope.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	115	404	0
Non-Labor	900	3,150	0
NSE	0	0	0
Total	**1,015**	**3,554**	**0**
FTE	1.2	4.4	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
101350 - Los Coches Substation 138/69kV Rebuild

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10135.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 8. Los Coches Substation 138/69kV Rebuild
Workpaper Group: 101350 - Los Coches Substation 138/69kV Rebuild

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	2	19	439	554	0	0
Non-Labor	Zero-Based	0	0	123	4,295	1,620	849	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**125**	**4,314**	**2,060**	**1,403**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.2	3.4	5.5	0.0	0.0

Business Purpose:

the Business Purpose is to rebuild Los Coches 138/69/12kV substation due to reliability concerns. Los Coches substation is an existing SDG&E 138/69/12kV substation constructed in 1950's. Banks 50 and 51 are approaching end of their useful life, they are smaller than the current standard size transformers and under N-1 condition, one transformer out of service, the remaining transformer cannot handle the load. The 138kV and 69kV buses are at capacity, under sized and do not meet current seismic specification. The 12kV yard is at capacity with no room for installing the 4th 69/12kV distribution transformer.

Physical Description:

For this project, the substation scope of work includes building a new 138kV, 3000A bus outside the current fence on the SDG&E fee owned property in breaker and half configuration. The new yard will accommodate four bays ultimately; only two bays will be installed initially in this project. The scope includes dismantling the existing 138kV bus to make room for the new 69kV, double-breaker- double bus configuration. There will be a total of sixteen bays to accommodate the existing transmission and distribution transformers, lines and also positions for future additions. The new yard arrangement will make room for the 4th, 69/12kV transformer and additional four 12kV circuits shunt capacitors and reactors. The transmission scope of work entails replacing and relocating approximately six 138kV poles, reconductoring approximately 3,200 circuit feet of conductor, replacing and relocating approximately six 69kV transmission poles, and reconductoring approximately 1,000 circuit feet of conductor. The distribution scope of work includes transferring 12kV facilties underbuilt on the transmission structures, relocating and cutting over 12kV circuits to the new getaway structures, and modifying the existing facilities to facilitate transmission construction.

Project Justification:

Los Coches substation is a critical transmission and distribution power center within the SDG&E grid. Los Coches substation sited in the outer eastern edge of the more densely populated SDG&E load center, functions as a gateway for power to the eastern San Diego County customer base. This project is required to enhance reliability by replacing the obsolete and under-rated transformer banks 50, 51, oil breakers; upgrading the 138kV and 69kV buses to 3000A capacity, increasing customer reliability with 69kV quad bus arrangement, enhance the seismic capability and make room for the proposed distribution 4th bank. In the past, various projects have been proposed and approved to mitigate the reliability and load issues. This project consolidates all the pending projects and it needs to be done at an accelerated schedule.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10135.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	8. Los Coches Substation 138/69kV Rebuild
Workpaper Group:	101350 - Los Coches Substation 138/69kV Rebuild

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E utilizes comprehensive cost estimating programs to develop detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E utilizes comprehensive cost estimating programs to develop detailed cost estimates, based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10135.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 8. Los Coches Substation 138/69kV Rebuild
Workpaper Group: 101350 - Los Coches Substation 138/69kV Rebuild

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	554	0	0	0	0	0	554	0	0
Non-Labor	Zero-Based	849	0	0	0	0	0	849	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**1,403**	**0**	**0**	**0**	**0**	**0**	**1,403**	**0**	**0**
FTE	Zero-Based	5.5	0.0	0.0	0.0	0.0	0.0	5.5	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10135.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 8. Los Coches Substation 138/69kV Rebuild
Workpaper Group: 101350 - Los Coches Substation 138/69kV Rebuild

Determination of Adjusted-Recorded:

	2012 ($000)	2013 ($000)	2014 ($000)	2015 ($000)	2016 ($000)
Recorded (Nominal $)*					
Labor	0	0	2	17	377
Non-Labor	0	0	118	4,236	1,620
NSE	0	0	0	0	0
Total	**0**	**0**	**120**	**4,252**	**1,997**
FTE	0.0	0.0	0.0	0.2	2.9
Adjustments (Nominal $) **					
Labor	0	0	0	0	0
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Nominal $)					
Labor	0	0	2	17	377
Non-Labor	0	0	118	4,236	1,620
NSE	0	0	0	0	0
Total	**0**	**0**	**120**	**4,252**	**1,997**
FTE	0.0	0.0	0.0	0.2	2.9
Vacation & Sick (Nominal $)					
Labor	0	0	0	3	63
Non-Labor	0	0	0	0	0
NSE	0	0	0	0	0
Total	**0**	**0**	**0**	**3**	**63**
FTE	0.0	0.0	0.0	0.0	0.5
Escalation to 2016$					
Labor	0	0	0	0	0
Non-Labor	0	0	5	59	0
NSE	0	0	0	0	0
Total	**0**	**0**	**5**	**59**	**0**
FTE	0.0	0.0	0.0	0.0	0.0
Recorded-Adjusted (Constant 2016$)					
Labor	0	0	2	19	439
Non-Labor	0	0	123	4,295	1,620
NSE	0	0	0	0	0
Total	**0**	**0**	**125**	**4,314**	**2,060**
FTE	0.0	0.0	0.0	0.2	3.4

* 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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10135.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 8. Los Coches Substation 138/69kV Rebuild
Workpaper Group: 101350 - Los Coches Substation 138/69kV Rebuild

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 101350

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10135.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	8. Los Coches Substation 138/69kV Rebuild
Workpaper Group:	101350 - Los Coches Substation 138/69kV Rebuild
Workpaper Detail:	101350.001 - Los Coches Substation 138/69kV Rebuild
In-Service Date:	12/31/2017

Description:

For this project the substation scope of work includes building a new 138kV, 3000A bus outside the current fence on the SDG&E fee owned property in breaker and half configuration. The new yard will accommodate four bays ultimately; only two bays will be installed initially in this project. The scope includes dismantling the existing 138kV bus to make room for the new 69kV, double-breaker- double bus configuration. There will be a total of sixteen bays to accommodate the existing transmission and distribution transformers, lines and also positions for future additions. The new yard arrangement will make room for the 4th, 69/12kV transformer and additional four 12kV circuits shunt capacitors and reactors. The transmission scope of work entails replacing and relocating approximately six 138kV poles, reconductoring approximately 3,200 circuit feet of conductor, replacing and relocating approximately six 69kV transmission poles, and reconductoring approximately 1,000 circuit feet of conductor. The distribution scope of work includes transferring 12kV facilties underbuilt on the transmission structures, relocating and cutting over 12kV circuits to the new getaway structures, and modifying the existing facilities to facilitate transmission construction.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	554	0	0
Non-Labor	849	0	0
NSE	0	0	0
Total	**1,403**	**0**	**0**
FTE	5.5	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
10144A - TL691 Avo-Mon Wood to Steel - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10144.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 9. TL691 Avo-Mon Wood to Steel
Workpaper Group: 10144A - TL691 Avo-Mon Wood to Steel - RAMP

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	13	32	0
Non-Labor	Zero-Based	0	0	0	0	0	55	130	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**68**	**162**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0

Business Purpose:

To reinforce OH infrastructure in the back country.

Physical Description:

Replace (114) wood poles with a combination of direct-buried steel poles, wood equivalent SW poles and selft-supporting tubular steel poles on drilled pier or micropile foundations and install aproximately 8.7 miles of new 636 ACSR/AW conductor from Pendleton to Monserate to Avocado substation.

Project Justification:

As part of the wood to steel initiative, we are replacing wood infrastructure with steel infrastructure to increase fire safety and service reliability.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10144.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	9. TL691 Avo-Mon Wood to Steel
Workpaper Group:	10144A - TL691 Avo-Mon Wood to Steel - RAMP

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 10144A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10144.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	9. TL691 Avo-Mon Wood to Steel
Workpaper Group:	10144A - TL691 Avo-Mon Wood to Steel - RAMP
Workpaper Detail:	10144A.001 - RAMP - Incremental - TL691 Avo-Mon Wood to Steel
In-Service Date:	12/31/2018

Description:

RAMP-Replace (114) wood poles with a combination of direct-buried steel poles, wood equivalent SW poles and selft-supporting tubular steel poles on drilled pier or micropile foundations and install aproximately 8.7 miles of new 636 ACSR/AW conductor from Pendleton to Monserate to Avocado substation.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	13	32	0
Non-Labor	55	130	0
NSE	0	0	0
Total	**68**	**162**	**0**
FTE	0.1	0.3	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10144.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	9. TL691 Avo-Mon Wood to Steel
Workpaper Group:	10144A - TL691 Avo-Mon Wood to Steel - RAMP
Workpaper Detail:	10144A.001 - RAMP - Incremental - TL691 Avo-Mon Wood to Steel

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: Wood to Steel Program - Major Projects - Distrib

Program Description: Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability

Risk/Mitigation:

Risk: SDG&E-01

Mitigation: Inspection, Repair, Maintenance & Replacement Programs

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	1,054	4,641	4,323
High	1,434	5,311	5,879

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: n

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: The RAMP items included the Following Budget Codes14137-101430-101450-91320-9137-10146-10147-10149 an PTY

Beginning of Workpaper Group
10146A - TL695 Talega Wood to Steel - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10146.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 10. TL695 Talega Wood to Steel
Workpaper Group: 10146A - TL695 Talega Wood to Steel - RAMP

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	24	223	0
Non-Labor	Zero-Based	0	0	0	0	0	99	917	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**123**	**1,140**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.2	2.2	0.0

Business Purpose:

To reinforce OH infrastructure in the back country.

Physical Description:

Replace existing conductor, replace approximately (100) existing wood poles structures, along an approximately 10-mile long, 69 kV power line primarily located on federal military lands in the eastern portion of MCBCP with a small portion being located in the City of San Clemente.

Project Justification:

Mitigate category B violation overload from outage on TL690 during peak loading conditions.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10146.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	10. TL695 Talega Wood to Steel
Workpaper Group:	10146A - TL695 Talega Wood to Steel - RAMP

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 10146A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10146.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	10. TL695 Talega Wood to Steel
Workpaper Group:	10146A - TL695 Talega Wood to Steel - RAMP
Workpaper Detail:	10146A.001 - RAMP - Incremental TL695 Talega Wood to Steel
In-Service Date:	09/30/2018

Description:

RAMP-Replace existing conductor replace approximately (100) existing wood poles structures, along an approximately 10-mile long, 69 kV power line primarily located on federal military lands in the eastern portion of MCBCP with a small portion being located in the City of San Clemente.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	24	223	0
Non-Labor	99	917	0
NSE	0	0	0
Total	**123**	**1,140**	**0**
FTE	0.2	2.2	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10146.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	10. TL695 Talega Wood to Steel
Workpaper Group:	10146A - TL695 Talega Wood to Steel - RAMP
Workpaper Detail:	10146A.001 - RAMP - Incremental TL695 Talega Wood to Steel

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: TL695 Talega Wood to Steel

Program Description: Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability

Risk/Mitigation:

Risk: Wild Fire

Mitigation: Inspection, Repair, Maintenance & Replacement Programs

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: Hi Low RAMP items are under BC 10144

Beginning of Workpaper Group
10147A - TL697 San Luis Rey Wood to Steel - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10147.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 11. TL697 San Luis Rey Wood to Steel
Workpaper Group: 10147A - TL697 San Luis Rey Wood to Steel - RAMP

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	38	454	0
Non-Labor	Zero-Based	0	0	0	0	0	158	1,870	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**196**	**2,324**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.4	4.6	0.0

Business Purpose:

To reinforce OH infrastructure in the back country.

Physical Description:

TL697: Replace existing wires (reconductor) and replace (42) wood pole structures with new dull galvanized steel pole structures. Total length is approximately 3.3 miles from San Luis Rey to Oceanside substation and located within a 60' SDG&E ROW (shared with TL690A)
TL690A: 69 kV Reconductoring, removal of (48) existing wood pole structures, and installation of new steel pole structures (direct-bury and foundation pole structures) within existing power line alignments between Oceanside and San Luis Rey substation. Total length is approximately 3 miles within MCBCP and it is located within a 60' SDG&E ROW (shared with TL697).

Project Justification:

TL697: Increase electrical reliability to meet MCBCP and the sorrounding area's electrical needs, increase fire safety and service reliability.
TL690A: Mitigate category B NERC violation, increase electrical reliability to meet MCBCP and the sorrounding area's electrical needs, increase fire safety and service reliability.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10147.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	11. TL697 San Luis Rey Wood to Steel
Workpaper Group:	10147A - TL697 San Luis Rey Wood to Steel - RAMP

Forecast Methodology:

Labor - Zero-Based

Zero Based -The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

Zero Based - The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 10147A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10147.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	11. TL697 San Luis Rey Wood to Steel
Workpaper Group:	10147A - TL697 San Luis Rey Wood to Steel - RAMP
Workpaper Detail:	10147A.001 - RAMP - Incremental TL697 San Luis Rey Wood to Steel
In-Service Date:	03/31/2018

Description:

Replace existing wires (reconductor) and replace (42) wood pole structures with new dull galvanized steel pole structures. Total length is approximately 3.3 miles from San Luis Rey to Oceanside substation and located within a 60' SDG&E ROW (shared with TL690A)

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	19	227	0
Non-Labor	79	935	0
NSE	0	0	0
Total	**98**	**1,162**	**0**
FTE	0.2	2.3	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10147.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	11. TL697 San Luis Rey Wood to Steel
Workpaper Group:	10147A - TL697 San Luis Rey Wood to Steel - RAMP
Workpaper Detail:	10147A.001 - RAMP - Incremental TL697 San Luis Rey Wood to Steel

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: TL697 San Luis Rey Wood to Steel

Program Description: Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability

Risk/Mitigation:

Risk: Wild Fire

Mitigation: Inspection, Repair, Maintenance & Replacement Programs

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: Hi Low RAMP items are under BC 10144

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10147.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	11. TL697 San Luis Rey Wood to Steel
Workpaper Group:	10147A - TL697 San Luis Rey Wood to Steel - RAMP
Workpaper Detail:	10147A.002 - RAMP - Incremental TL690A - Pendleton South - Wood to Steel
In-Service Date:	03/31/2018

Description:

69 kV Reconductoring removal of (48) existing wood pole structures, and installation of new steel pole structures (direct-bury and foundation pole structures) within existing power line alignments between Oceanside and San Luis Rey substation. Total length is approximately 3 miles within MCBCP and it is located within a 60' SDG&E ROW (shared with TL697).

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	19	227	0
Non-Labor	79	935	0
NSE	0	0	0
Total	**98**	**1,162**	**0**
FTE	0.2	2.3	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10147.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	11. TL697 San Luis Rey Wood to Steel
Workpaper Group:	10147A - TL697 San Luis Rey Wood to Steel - RAMP
Workpaper Detail:	10147A.002 - RAMP - Incremental TL690A - Pendleton South - Wood to Steel

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: TL690A

Program Description: Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability

Risk/Mitigation:

Risk: Wildfire

Mitigation: Inspection, Repair, Maintenance & Replacement Programs

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: Hi Low RAMP items are under BC 10144

Beginning of Workpaper Group
10149A - TL6912 Wood to Steel Pole Replacement - RAMP

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 10149.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 13. TL6912 Wood to Steel Pole Replacement
Workpaper Group: 10149A - TL6912 Wood to Steel Pole Replacement - RAMP

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	13	48	0
Non-Labor	Zero-Based	0	0	0	0	0	53	197	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**66**	**245**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.0

Business Purpose:

To reinforce OH infrastructure in the back country.

Physical Description:

Replace (75) wood poles with a combination of direct buried steel poles and equivalent (SW) poles and self-supporting tubular steel poles on concrete anchor bolt foundation or micropile foundations. Approximately 5.5 miles from San Luis Rey to Pendleton substation.

Project Justification:

As part of the wood to steel initiative, we are replacing wood infrastructure with steel infrastructure Increase fire safety and service reliability.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10149.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	13. TL6912 Wood to Steel Pole Replacement
Workpaper Group:	10149A - TL6912 Wood to Steel Pole Replacement - RAMP

Forecast Methodology:

Labor - Zero-Based

Zero Based -The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

Zero Based - The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 10149A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10149.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	13. TL6912 Wood to Steel Pole Replacement
Workpaper Group:	10149A - TL6912 Wood to Steel Pole Replacement - RAMP
Workpaper Detail:	10149A.001 - RAMP - Incremental TL6912 Wood to Steel Pole Replacement
In-Service Date:	12/31/2018

Description:

Replace (75) wood poles with a combination of direct buried steel poles and equivalent (SW) poles and self-supporting tubular steel poles on concrete anchor bolt foundation or micropile foundations. Approximately 5.5 miles from San Luis Rey to Pendleton substation.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	13	48	0
Non-Labor	53	197	0
NSE	0	0	0
Total	**66**	**245**	**0**
FTE	0.1	0.5	0.0

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	10149.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	13. TL6912 Wood to Steel Pole Replacement
Workpaper Group:	10149A - TL6912 Wood to Steel Pole Replacement - RAMP
Workpaper Detail:	10149A.001 - RAMP - Incremental TL6912 Wood to Steel Pole Replacement

RAMP Item # 1

RAMP Chapter: SDG&E-1

Program Name: TL6912 Wood to Steel

Program Description: Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability

Risk/Mitigation:

Risk: Wildfire

Mitigation: Inspection, Repair, Maintenance & Replacement Programs

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: NA

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: Hi and Low for this BC is under BC 10144

Beginning of Workpaper Group
11126A - TL663 Mission To Kearny Reconducto

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11126.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 14. TL663 Mission To Kearny Reconductor
Workpaper Group: 11126A - TL663 Mission To Kearny Reconducto

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	173	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**	**173**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0

Business Purpose:

The Business Purpose is to provide a long term “wires” mitigation for the identified NERC CAT B reliability criteria indications. Availability of the short-term non-wires option of depending on the pre-contingency dispatch of the Kearny gas turbines to provide loading relief is no longer available after 2013. Additionally, SDG&E does not consider reliance on pre-contingency gas turbine dispatch as a suitable long-term solution for sustained NERC reliability criteria indications.

Physical Description:

The purpose of this project is to improve the 69kV transmission local area system within the Mission/Kearny/Mesa Heights load center and mitigate NERC Category B reliability criteria. The scope of work entails reconductoring the line to provide a new minimum continous rating of 204MVA. The scope requires a complete reconductor of overhead line from 1-1033.5ACSR/AW and 2-336.4ACSR/AW to 2-636ACSS. The underground portion of the project requires pulling new cable through existing ducts to create bundled 1750MCM AL cable. Excluding the existing steel poles in the line, there will be a 100% wood pole change-out to accommodate the increased loading of the new conductors. The terminal equipment at both ends of the line were evaluated and only the Kearny substation end of TL663 will require equipment replacement to 2000A capacity to match the Mission end in order to achieve the new required rating.

Project Justification:

Beginning in 2015, NERC Category B reliability criteria indicate overloads on TL663 (Mission-Kearny), caused by the outage of TL676 (Kearny–Mesa Heights). In addition, beginning in 2015 and beyond, NERC Category C indications appear during outage simulations for the Mission 69kV south bus. The scope of the mitigation is reconductoring the existing 69kV line to a minimum of 204MVA continuous rating. The limitations are caused by the 1750MCM AL UG cable and the bundled 336ACSR/AW overhead conductor. The existing continuous rating of TL663 is 97MVA and the 9 hour emergency rating is 129MVA.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11126.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	14. TL663 Mission To Kearny Reconductor
Workpaper Group:	11126A - TL663 Mission To Kearny Reconducto

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 11126A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11126.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	14. TL663 Mission To Kearny Reconductor
Workpaper Group:	11126A - TL663 Mission To Kearny Reconducto
Workpaper Detail:	11126A.001 - TL663 Mission To Kearny Reconductor
In-Service Date:	06/30/2018

Description:

The purpose of this project is to improve the 69kV transmission local area system within the Mission/Kearny/Mesa Heights
load center and mitigate NERC Category B reliability criteria. The scope of work entails reconductoring the line to provide a
new minimum continous rating of 204MVA. The scope requires a complete reconductor of overhead line from 1-1033.5ACSR/AW and 2-336.4ACSR/AW to 2-636ACSS. The underground portion of the project requires pulling new cable through existing ducts to create bundled 1750MCM AL cable. Excluding the existing steel poles in the line, there will
be a 100% wood pole change-out to accommodate the increased loading of the new conductors. The terminal equipment at
both ends of the line were evaluated and only the Kearny substation end of TL663 will require equipment replacement to 2000A capacity to match the Mission end in order to achieve the new required rating.

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	173	0
Non-Labor	0	0	0
NSE	0	0	0
Total	**0**	**173**	**0**
FTE	0.0	1.7	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
111330 - TL664-WOOD TO STEEL

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11133.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 15. TL664_668 Miramar Wood to Steel
Workpaper Group: 111330 - TL664-WOOD TO STEEL

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	35	0	0
Non-Labor	Zero-Based	0	0	0	0	0	270	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**305**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0

Business Purpose:

To reinforce OH infrastructure and replace poles that are out of compliance.

Physical Description:

Replace approximately 21 wood poles with 14 steel direct-buried poles and 7 engineered steel foundation poles along a portion of the TL664 & TL668 transmission lines. All existing conductor is transferred to the new poles.

Project Justification:

As a result of the fires in San Diego county; Transmission line outages due to fires have serious impacts on utility electric system reliability and the resulting loss of electric service can debilitate emergency services and our customer's abilities to cope during the fire emergency. In an effort to reduce future damage and enhance the line's fire resistance, wood poles on TL664 and TL668 within fire threat zone on the western edge of Miramar has been targeted for replacement with equivalent steel poles.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11133.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	15. TL664_668 Miramar Wood to Steel
Workpaper Group:	111330 - TL664-WOOD TO STEEL

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11133.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 15. TL664_668 Miramar Wood to Steel
Workpaper Group: 111330 - TL664-WOOD TO STEEL

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	35	0	0	35	0	0
Non-Labor	Zero-Based	0	0	0	270	0	0	270	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**305**	**0**	**0**	**305**	**0**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11133.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 15. TL664_668 Miramar Wood to Steel
Workpaper Group: 111330 - TL664-WOOD TO STEEL

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 11133.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 15. TL664_668 Miramar Wood to Steel
Workpaper Group: 111330 - TL664-WOOD TO STEEL

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 111330

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	11133.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	15. TL664_668 Miramar Wood to Steel
Workpaper Group:	111330 - TL664-WOOD TO STEEL
Workpaper Detail:	111330.001 - TL664_668 Miramar Wood to Steel
In-Service Date:	01/31/2017

Description:

Reliability projec TL664_668 Miramar Wood to Steel

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	35	0	0
Non-Labor	270	0	0
NSE	0	0	0
Total	**305**	**0**	**0**
FTE	0.3	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
121370 - TL6916-WOOD TO STEEL

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12137.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 16. TL6916 Sycamore Canyon to Scripps Wood to Steel
Workpaper Group: 121370 - TL6916-WOOD TO STEEL

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	58
Non-Labor	Zero-Based	0	0	0	0	0	0	0	200
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**258**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0

Business Purpose:

This project is a wood to steel equivalent from Sycamore Substation from Z100980 to Z973033, then Z973032 to Z678465.
The project spans approximately 4.77 miles.

Physical Description:

Fire hardening wood to steel . Replace wood ples with steel poles with approximate tie line distance of 4.77 miles.

Project Justification:

Mitigate poetential fire threat to transmission facilities.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12137.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	16. TL6916 Sycamore Canyon to Scripps Wood to Steel
Workpaper Group:	121370 - TL6916-WOOD TO STEEL

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12137.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 16. TL6916 Sycamore Canyon to Scripps Wood to Steel
Workpaper Group: 121370 - TL6916-WOOD TO STEEL

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	0	58	0	0	58
Non-Labor	Zero-Based	0	0	0	0	0	200	0	0	200
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**258**	**0**	**0**	**258**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	6.0

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12137.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 16. TL6916 Sycamore Canyon to Scripps Wood to Steel
Workpaper Group: 121370 - TL6916-WOOD TO STEEL

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12137.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 16. TL6916 Sycamore Canyon to Scripps Wood to Steel
Workpaper Group: 121370 - TL6916-WOOD TO STEEL

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 121370

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12137.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	16. TL6916 Sycamore Canyon to Scripps Wood to Steel
Workpaper Group:	121370 - TL6916-WOOD TO STEEL
Workpaper Detail:	121370.001 - TL6916 Sycamore Canyon to Scripps Wood to Steel
In-Service Date:	01/31/2019

Description:

Reliability Project TL6916 Sycamore Canyon to Scripps Wood to Steel (NB)

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	58
Non-Labor	0	0	200
NSE	0	0	0
Total	**0**	**0**	**258**
FTE	0.0	0.0	6.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
12149A - TL694 Wood To Steel

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 12149.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 17. TL694 Wood To Steel
Workpaper Group: 12149A - TL694 Wood To Steel

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	87
Non-Labor	Zero-Based	0	0	0	0	0	0	0	675
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**762**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9

Business Purpose:

Project will harden the electric transmission system to increase reliability in the region.

Physical Description:

This project replaces approximately 42 wood poles for equivalent steel structures.

Project Justification:

Preliminary engineering.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12149.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	17. TL694 Wood To Steel
Workpaper Group:	12149A - TL694 Wood To Steel

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 12149A

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	12149.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	17. TL694 Wood To Steel
Workpaper Group:	12149A - TL694 Wood To Steel
Workpaper Detail:	12149A.001 - TL694 Wood To Steel
In-Service Date:	01/31/2019

Description:

This project replaces approximately 42 wood poles for equivalent steel structures.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	87
Non-Labor	0	0	675
NSE	0	0	0
Total	**0**	**0**	**762**
FTE	0.0	0.0	0.9

Note: Totals may include rounding differences.

Beginning of Workpaper Group
13130A - TL674 Loop-in

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13130.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 18. TL674 Loop-in
Workpaper Group: 13130A - TL674 Loop-in

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	3	3	483
Non-Labor	Zero-Based	0	0	0	0	0	15	15	1,983
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**18**	**18**	**2,466**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.1	0.1	4.8

Business Purpose:

At Del Mar Sub Remove From Service (RFS) TL666D [Del Mar Sub – Del Mar Tap]. At Via De La Valle, RFS the existing Tap on TL674 [EN-NCW-SF] and build two circuits: Del Mar – North City West and Encinitas – Rancho Santa FE. Terminate the new Del Mar – North City West circuit and the old TL666D CB.

Physical Description:

At Del Mar Sub Remove From Service (RFS) TL666D [Del Mar Sub – Del Mar Tap]. At Via De La Valle, RFS the existing Tap on TL674 [EN-NCW-SF] and build two circuits: Del Mar – North City West and Encinitas – Rancho Santa FE. Terminate the new Del Mar – North City West circuit and the old TL666D CB. RAMP - At Del Mar Sub Remove From Service (RFS) TL666D [Del Mar Sub – Del Mar Tap]. At Via De La Valle, RFS the existing Tap on TL674 [EN-NCW-SF] and build two circuits: Del Mar – North City West and Encinitas – Rancho Santa FE. Terminate the new Del Mar – North City West circuit and the old TL666D CB. RAMP - At Del Mar Sub Remove From Service (RFS) TL666D [Del Mar Sub – Del Mar Tap]. At Via De La Valle, RFS the existing Tap on TL674 [EN-NCW-SF] and build two circuits: Del Mar – North City West and Encinitas – Rancho Santa FE. Terminate the new Del Mar – North City West circuit and the old TL666D CB.

Project Justification:

TL 666D is an aging infrastructure that needs to be either undergrounded or removed from service. Undergrounding TL666D can be costly. Removing TL666D is an environmentally sounded alternative with additional benefit of reducing the outage exposure of the remaining portion of TL666. To maintain the same reliability at Del Mar, the three terminal line on TL674 will be RFS'ed creating two circuits Del Mar – North City West and Encinitas – Rancho Santa FE.

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	13130.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	18. TL674 Loop-in
Workpaper Group:	13130A - TL674 Loop-in

Forecast Methodology:

Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects. Actuals for the last 3 years do not align with the forecast. Therefore we used zero based forecast in GRID, which was also used in prior GRC.

Non-Labor - Zero-Based

The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects. Actuals for the last 3 years do not align with the forecast. Therefore we used zero based forecast in GRID, which was also used in prior GRC.

NSE - Zero-Based

N/A

Beginning of Workpaper Sub Details for
Workpaper Group 13130A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 13130.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 18. TL674 Loop-in
Workpaper Group: 13130A - TL674 Loop-in
Workpaper Detail: 13130A.001 - TL674 Loop-in

In-Service Date: 12/31/2019

Description:

At Del Mar Sub Remove From Service (RFS) TL666D [Del Mar Sub – Del Mar Tap]. At Via De La Valle, RFS the existing Tap on TL674 [EN-NCW-SF] and build two circuits: Del Mar – North City West and Encinitas – Rancho Santa FE. Terminate the new Del Mar – North City West circuit and the old TL666D CB.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	3	3	483
Non-Labor	15	15	1,983
NSE	0	0	0
Total	**18**	**18**	**2,466**
FTE	0.1	0.1	4.8

Note: Totals may include rounding differences.

Beginning of Workpaper Group
141400 - TL698 WOOD TO STEEL PROJECT

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14140.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 19. TL698 Monserate - Avocado Wood to Steel
Workpaper Group: 141400 - TL698 WOOD TO STEEL PROJECT

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	87	87
Non-Labor	Zero-Based	0	0	0	0	0	0	675	675
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**762**	**762**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9

Business Purpose:

Project will harde the electric transmission system to increase realibility in the region

Physical Description:

This project replaces approximately 78 wood poles for equivalent steel structures in fire threat zone between Monserate and Avocado substation

Project Justification:

Preliminary Engineering

Note: Totals may include rounding differences.

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	14140.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	19. TL698 Monserate - Avocado Wood to Steel
Workpaper Group:	141400 - TL698 WOOD TO STEEL PROJECT

Forecast Methodology:

Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

Non-Labor - Zero-Based

The forecast method used is zero based. The forecast is based on detailed cost estimates that were developed based on the specific scope of work for the project. SDG&E develops detailed cost estimates based on current construction labor rates, material costs, overhead rates, contract pricing/quotes, and other project specific details. When projects are completed, actual costs are compared to the estimate to verify the estimates are accurate. Any significant variances between the estimated cost for a project and the actuals costs are scrutinized to determine if cost estimate inputs need to be adjusted for future projects.

NSE - Zero-Based

N/A

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14140.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 19. TL698 Monserate - Avocado Wood to Steel
Workpaper Group: 141400 - TL698 WOOD TO STEEL PROJECT

Summary of Adjustments to Forecast

In 2016 $ (000)										
Forecast Method		**Base Forecast**			**Forecast Adjustments**			**Adjusted-Forecast**		
Years		**2017**	**2018**	**2019**	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Labor	Zero-Based	0	0	0	0	87	87	0	87	87
Non-Labor	Zero-Based	0	0	0	0	675	675	0	675	675
NSE	Zero-Based	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**762**	**762**	**0**	**762**	**762**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.9	0.9	0.0	0.9	0.9

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14140.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 19. TL698 Monserate - Avocado Wood to Steel
Workpaper Group: 141400 - TL698 WOOD TO STEEL PROJECT

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14140.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 19. TL698 Monserate - Avocado Wood to Steel
Workpaper Group: 141400 - TL698 WOOD TO STEEL PROJECT

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 141400

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 14140.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 19. TL698 Monserate - Avocado Wood to Steel
Workpaper Group: 141400 - TL698 WOOD TO STEEL PROJECT
Workpaper Detail: 141400.001 - TL698 Monserate - Avocado Wood to Steel

In-Service Date: 01/31/2019

Description:

Reliability Project TL698 Monserate - Avocado Wood to Steel

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	87	87
Non-Labor	0	675	675
NSE	0	0	0
Total	**0**	**762**	**762**
FTE	0.0	0.9	0.9

Note: Totals may include rounding differences.

Beginning of Workpaper Group
162540 - DER Integration

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16254.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 22. DER Integration
Workpaper Group: 162540 - DER Integration

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:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16254.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	22. DER Integration
Workpaper Group:	162540 - DER Integration

Forecast Methodology:

Labor - Zero-Based

Non-Labor - Zero-Based

NSE - Zero-Based

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16254.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 22. DER Integration
Workpaper Group: 162540 - DER Integration

Summary of Adjustments to Forecast

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

Forecast Adjustment Details

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16254.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 22. DER Integration
Workpaper Group: 162540 - DER Integration

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 16254.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 22. DER Integration
Workpaper Group: 162540 - DER Integration

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 162540

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16254.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	22. DER Integration
Workpaper Group:	162540 - DER Integration
Workpaper Detail:	162540.001 - DER INTEGRATION
In-Service Date:	Not Applicable

Description:

delete

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:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	16254.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	22. DER Integration
Workpaper Group:	162540 - DER Integration
Workpaper Detail:	162540.002 - DER Integration
In-Service Date:	04/30/2018

Description:

DER Integration

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.

Beginning of Workpaper Group
172470 - SUBSTATION RELAY MODERNIZATION

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17247.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 23. SUBSTATION RELAY MODERNIZATION
Workpaper Group: 172470 - SUBSTATION RELAY MODERNIZATION

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:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17247.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	23. SUBSTATION RELAY MODERNIZATION
Workpaper Group:	172470 - SUBSTATION RELAY MODERNIZATION

Forecast Methodology:

Labor - Zero-Based

Non-Labor - Zero-Based

NSE - Zero-Based

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17247.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 23. SUBSTATION RELAY MODERNIZATION
Workpaper Group: 172470 - SUBSTATION RELAY MODERNIZATION

Summary of Adjustments to Forecast

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

Forecast Adjustment Details

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: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17247.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 23. SUBSTATION RELAY MODERNIZATION
Workpaper Group: 172470 - SUBSTATION RELAY MODERNIZATION

Determination of Adjusted-Recorded:

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

* After company-wide exclusions of Non-GRC costs
** Refer to "Detail of Adjustments to Recorded" page for line item adjustments
Note: Totals may include rounding differences.

Area: ELECTRIC DISTRIBUTION
Witness: Alan F. Colton
Budget Code: 17247.0
Category: K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub: 23. SUBSTATION RELAY MODERNIZATION
Workpaper Group: 172470 - SUBSTATION RELAY MODERNIZATION

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 172470

Area:	ELECTRIC DISTRIBUTION
Witness:	Alan F. Colton
Budget Code:	17247.0
Category:	K. TRANSMISSION/FERC DRIVEN PROJECTS
Category-Sub:	23. SUBSTATION RELAY MODERNIZATION
Workpaper Group:	172470 - SUBSTATION RELAY MODERNIZATION
Workpaper Detail:	172470.001 - SUBSTATION RELAY MODERNIZATION
In-Service Date:	Not Applicable

Description:

SUBSTATION RELAY MODERNIZATION

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.