

Application of SOUTHERN CALIFORNIA GAS)
COMPANY for authority to update its gas revenue)
requirement and base rates)
effective January 1, 2016 (U 904-G))

Application No. 14-11-____
Exhibit No.: (SCG-06-CWP)

CAPITAL WORKPAPERS TO
PREPARED DIRECT TESTIMONY
OF PHILLIP E. BAKER
ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

NOVEMBER 2014



**2016 General Rate Case - APP
INDEX OF WORKPAPERS**

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Capital Workpapers

Overall Summary For Exhibit No. SCG-06-CWP

Area:	UNDERGROUND STORAGE
Witness:	Phillip E. Baker

In 2013 \$ (000)			
Adjusted-Forecast			
	2014	2015	2016
B. Compressor Stations	7,791	7,790	7,790
C. Wells	33,898	36,870	61,249
D. Pipelines	6,546	10,083	4,931
E. Purification Equipment	8,796	7,605	7,605
F. Auxiliary Equipment	14,398	11,922	8,948
Total	71,429	74,270	90,523

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Category: B. Compressor Stations
Workpaper: VARIOUS

Summary for Category: B. Compressor Stations

	In 2013\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2013	2014	2015	2016
Labor	0	555	555	553
Non-Labor	0	7,236	7,235	7,237
NSE	0	0	0	0
Total	0	7,791	7,790	7,790
FTE	0.0	5.2	5.2	5.1

00411A Gas Storage - Compressor Stations - Goleta - Units #2 and #3 Overhauls

Labor	0	18	162	0
Non-Labor	0	235	2,110	0
NSE	0	0	0	0
Total	0	253	2,272	0
FTE	0.0	0.2	1.5	0.0

00411B Gas Storage - Compressor Stations - Blanket projects

Labor	0	537	393	553
Non-Labor	0	7,001	5,125	7,237
NSE	0	0	0	0
Total	0	7,538	5,518	7,790
FTE	0.0	5.0	3.7	5.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group

00411A - Gas Storage - Compressor Stations - Goleta - Units #2 and #3 Overhauls

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00411.0
 Category: B. Compressor Stations
 Category-Sub: 1. Gas Storage - Compressor Stations - Goleta - Units
 Workpaper Group: 00411A - Gas Storage - Compressor Stations - Goleta - Units #2 and #3 Overhauls

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	18	162	0
Non-Labor	Zero-Based	0	0	0	0	0	235	2,110	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	253	2,272	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.2	1.5	0.0

Business Purpose:

Compressor Units #2 and #3 at the La Goleta storage field have reached their maximum time in service between overhauls. This project is to overhaul Units #2 and #3 to restore and/or maintain their efficiency, capacity, and reliability.

Physical Description:

Perform overhaul of engine and compressor. Remove and install the following components: pistons, rings and rods; cylinder liners and new ss inserts; main bearings; camshaft and bearings; critical fasteners, timing and auxiliary chain; cylinder heads; intercooler; bundles and jacket water header; gaskets; thermocouples and thermostats; compressor: piston rings/packers/rider bands, cylinder liners.

Project Justification:

These compressors have reached the end of their service lives and have to be overhauled in order to avoid replacing them altogether. While parts and compressor service contractors are still available, an overhaul is typically the most cost-effective solution. Overhauls are performed when wear and tear prescribe their need. The needs are to maintain safe operation, to restore and/or maintain the units' efficiency, delivery capacity, maintain compliance with environmental regulations and provide reliable service.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00411.0
Category: B. Compressor Stations
Category-Sub: 1. Gas Storage - Compressor Stations - Goleta - Units
Workpaper Group: 00411A - Gas Storage - Compressor Stations - Goleta - Units #2 and #3 Overhauls

Forecast Methodology:

Labor - Zero-Based

Labor portion of this estimate is based on five years experience in this BC.

Non-Labor - Zero-Based

Costs are based on the knowledge of experienced personnel who have handled similar overhauls in the recent past. Such experience is tendered by recent costs of component parts and quotes by qualified contractors.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00411A**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00411.0
 Category: B. Compressor Stations
 Category-Sub: 1. Gas Storage - Compressor Stations - Goleta - Units
 Workpaper Group: 00411A - Gas Storage - Compressor Stations - Goleta - Units #2 and #3 Overhauls
 Workpaper Detail: 00411A.001 - Gas Storage - Compressor Stations - Goleta - Units #2 and #3 Overhauls
 In-Service Date: 09/30/2015
 Description:

Gas Storage - Compressor Stations

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		18	162	0
Non-Labor		235	2,110	0
NSE		0	0	0
	Total	253	2,272	0
FTE		0.2	1.5	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00411B - Gas Storage - Compressor Stations - Blanket projects

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00411.0
 Category: B. Compressor Stations
 Category-Sub: 2. Gas Storage - Compressor Stations - Blanket projec
 Workpaper Group: 00411B - Gas Storage - Compressor Stations - Blanket projects

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	537	393	553
Non-Labor	Zero-Based	0	0	0	0	0	7,001	5,125	7,237
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	7,538	5,518	7,790
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	5.0	3.7	5.1

Business Purpose:

Scope of work varies depending on compressor availability and needs. Work includes but is not limited to overhauls, rebuilds, major equipment replacements and upgrades to assets such as Critical Instrumentation, Power Turbines, Gear boxes, Compressors and Engines.

Physical Description:

Perform necessary replacements, installations, and upgrades at the Aliso Canyon, Honor Rancho and La Goleta storage fields to address safety, maintain or improve reliability, meet regulatory and environmental requirements, and to meet the required injection capacities of the main compressors units. This estimate is for replacing and/or upgrading aging and obsolete compressor equipment that will be accomplished via smaller projects not qualifying for individual work papers. These will be worked as "Blanket" projects and will vary from tens of thousands to several hundred thousands of dollars.

Individual jobs in this budget code will vary from under \$10,000 to as high as several hundred thousands of dollars.

Project Justification:

Compressor Station equipment must have continuing "capital maintenance" as items continue to age and to wear out. Deferring these projects may jeopardize safety or cause equipment to shut down which can threaten gas supply continuity in the Transmission, and ultimately Distribution, systems.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00411.0
Category: B. Compressor Stations
Category-Sub: 2. Gas Storage - Compressor Stations - Blanket projec
Workpaper Group: 00411B - Gas Storage - Compressor Stations - Blanket projects

Forecast Methodology:

Labor - Zero-Based

The labor portion of this estimate is based on five years of recorded costs in this BC.

Non-Labor - Zero-Based

This estimate is based on the local knowledge and judgement of the managers of each of the three storage fields, and the conditions in each that need correcting through blanket capital projects.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00411B**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00411.0
 Category: B. Compressor Stations
 Category-Sub: 2. Gas Storage - Compressor Stations - Blanket projec
 Workpaper Group: 00411B - Gas Storage - Compressor Stations - Blanket projects
 Workpaper Detail: 00411B.001 - Gas Storage - Compressor Stations - Blanket projects
 In-Service Date: Not Applicable
 Description:

Gas Storage - Compressor Stations

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		537	393	553
Non-Labor		7,001	5,125	7,237
NSE		0	0	0
	Total	7,538	5,518	7,790
FTE		5.0	3.7	5.1

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Category: C. Wells
Workpaper: VARIOUS

Summary for Category: C. Wells

	In 2013\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2013	2014	2015	2016
Labor	0	940	1,027	1,770
Non-Labor	0	31,560	34,445	59,479
NSE	0	1,398	1,398	0
Total	0	33,898	36,870	61,249
FTE	0.0	8.0	8.8	15.7

00412A Wellhead Valve Replacements

Labor	0	34	34	34
Non-Labor	0	1,160	1,160	1,160
NSE	0	0	0	0
Total	0	1,194	1,194	1,194
FTE	0.0	0.3	0.3	0.3

00412N Well Plug & Abandonments

Labor	0	112	179	135
Non-Labor	0	3,764	6,016	4,553
NSE	0	0	0	0
Total	0	3,876	6,195	4,688
FTE	0.0	1.0	1.5	1.2

00412W Gas Storage - Wells - Blanket projects

Labor	0	28	33	24
Non-Labor	0	946	1,092	800
NSE	0	0	0	0
Total	0	974	1,125	824
FTE	0.0	0.2	0.3	0.2

00412V Cushion Gas Purchase

Labor	0	0	0	0
Non-Labor	0	0	0	0
NSE	0	1,398	1,398	0
Total	0	1,398	1,398	0
FTE	0.0	0.0	0.0	0.0

00412U Storage Integrity Management Program (SIMP)

Labor	0	58	73	701
Non-Labor	0	1,950	2,437	23,571
NSE	0	0	0	0
Total	0	2,008	2,510	24,272
FTE	0.0	0.5	0.6	6.5

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Category: C. Wells
Workpaper: VARIOUS

		In 2013\$ (000)			
Adjusted-Recorded		Adjusted-Forecast			
2013		2014	2015	2016	

00412B Tubing Replacements

Labor	0	117	117	117
Non-Labor	0	3,924	3,924	3,924
NSE	0	0	0	0
Total	0	4,041	4,041	4,041
FTE	0.0	1.0	1.0	1.0

00412C Wellhead Leak Repairs

Labor	0	52	52	52
Non-Labor	0	1,755	1,755	1,755
NSE	0	0	0	0
Total	0	1,807	1,807	1,807
FTE	0.0	0.4	0.4	0.4

00412D Innerstring Installations

Labor	0	51	51	51
Non-Labor	0	1,656	1,656	1,656
NSE	0	0	0	0
Total	0	1,707	1,707	1,707
FTE	0.0	0.5	0.5	0.5

00412E Wells - Submersible Pump Replacements

Labor	0	16	16	16
Non-Labor	0	536	536	536
NSE	0	0	0	0
Total	0	552	552	552
FTE	0.0	0.1	0.1	0.1

00412F Well Stimulations/Re-perforations

Labor	0	5	5	5
Non-Labor	0	171	171	171
NSE	0	0	0	0
Total	0	176	176	176
FTE	0.0	0.1	0.1	0.1

00412G Well Gravel Packs

Labor	0	107	107	107
Non-Labor	0	3,608	3,608	3,608
NSE	0	0	0	0
Total	0	3,715	3,715	3,715
FTE	0.0	0.9	0.9	0.9

00412H Well Re-drills

Labor	0	64	58	0
Non-Labor	0	2,145	1,950	0
NSE	0	0	0	0
Total	0	2,209	2,008	0
FTE	0.0	0.5	0.5	0.0

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Category: C. Wells
Workpaper: VARIOUS

In 2013\$ (000)			
Adjusted-Recorded	Adjusted-Forecast		
2013	2014	2015	2016

00412J Well Replacements

Labor	0	296	302	528
Non-Labor	0	9,945	10,140	17,745
NSE	0	0	0	0
Total	0	10,241	10,442	18,273
FTE	0.0	2.5	2.6	4.5

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412A - Wellhead Valve Replacements

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 1. Wellhead Valve Replacements
 Workpaper Group: 00412A - Wellhead Valve Replacements

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	34	34	34
Non-Labor	Zero-Based	0	0	0	0	0	1,160	1,160	1,160
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	1,194	1,194	1,194
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3

Business Purpose:

Required replacement and upgrade of leaking, aging and obsolete wellhead valves located on various wells located throughout the storage fields.

Physical Description:

Replace and upgrade gas-leaking, aging, and obsolete wellhead valves located throughout the four storage fields.

Project Justification:

Necessary replacements due to obsolete and leaking wellhead valves. Leaking wellhead valves are a safety and environmental hazard if not replaced in a timely manner. Some of these valves have been in service for over fifty years.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 1. Wellhead Valve Replacements
Workpaper Group: 00412A - Wellhead Valve Replacements

Forecast Methodology:

Labor - Zero-Based

The labor portion of this estimate is based on five years of recorded costs in this BC.

Non-Labor - Zero-Based

There are approximately 12-15 non-workover rig wellhead valve projects per year at an approximate cost of \$85k each. Fourteen (14) projects were assumed for the total cost.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412A**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 1. Wellhead Valve Replacements
 Workpaper Group: 00412A - Wellhead Valve Replacements
 Workpaper Detail: 00412A.001 - Large well projects to be worked in multiple storage fields
 In-Service Date: Not Applicable
 Description:

Gas Storage - Wells

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		34	34	34
Non-Labor		1,160	1,160	1,160
NSE		0	0	0
	Total	1,194	1,194	1,194
FTE		0.3	0.3	0.3

Note: Totals may include rounding differences.

**Beginning of Workpaper Group
00412B - Tubing Replacements**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 2. Well Tubing Replacements
 Workpaper Group: 00412B - Tubing Replacements

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	117	117	117
Non-Labor	Zero-Based	0	0	0	0	0	3,924	3,924	3,924
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	4,041	4,041	4,041
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0

Business Purpose:

Required replacement and upgrade of leaking or corroded production tubing located in storage wells throughout the storage fields. The production tubing in the well has reached its useful life and requires replacement and/or upgrade.

Physical Description:

Perform necessary well production tubing replacements in existing storage wells. There are approximately 7 workover rig tubing replacement projects per year at an approximate cost of \$575k each. Cost includes the material and services required to secure the well, remove the existing expended tubing string, reinstall a new tubing string, valve work, and return the well to service.

Project Justification:

Tubing replacements are necessary to maintain aging well equipment when they have reached the end of their useful life. Leaking tubing strings can become a safety or environmental hazard if not replaced in a timely manner.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 2. Well Tubing Replacements
Workpaper Group: 00412B - Tubing Replacements

Forecast Methodology:

Labor - Zero-Based

There are approximately 7 workover rig tubing replacement projects per year among the various storage fields at an approximate cost of \$575k each. The labor portion of this estimate is based on five years recorded experience in this BC.

Non-Labor - Zero-Based

There are approximately 7 workover rig tubing replacement projects per year among the various storage fields at an approximate cost of \$575k each. The non-labor portion of this estimate is based on five years recorded experience in this BC.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412B**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 2. Well Tubing Replacements
 Workpaper Group: 00412B - Tubing Replacements
 Workpaper Detail: 00412B.001 - Wells - Capital Installations replacements major maintenance.
 In-Service Date: Not Applicable
 Description:

Gas Storage - Wells

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		117	117	117
Non-Labor		3,924	3,924	3,924
NSE		0	0	0
	Total	4,041	4,041	4,041
FTE		1.0	1.0	1.0

Note: Totals may include rounding differences.

**Beginning of Workpaper Group
00412C - Wellhead Leak Repairs**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 3. Wellhead Leak Repairs
 Workpaper Group: 00412C - Wellhead Leak Repairs

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	52	52	52
Non-Labor	Zero-Based	0	0	0	0	0	1,755	1,755	1,755
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	1,807	1,807	1,807
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4

Business Purpose:

Required replacement and upgrade of leaking wellhead seals located among the 229 existing storage wells throughout the storage fields. The wellhead seal leaks usually occur on aging wells where the seals have passed their useful lives and require replacement.

Physical Description:

Perform necessary replacement and upgrade of aging and leaking wellhead seals located on storage wells located throughout the storage fields. The cost includes the material and services required to remove, and reinstall each wellhead seal replacement and return the well to service.

Project Justification:

These are necessary seal replacements due to aging well equipment. The well must be removed from service and secured pending the replacement. The well will be unavailable for withdrawal or injection capacity until the work is completed.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 3. Wellhead Leak Repairs
Workpaper Group: 00412C - Wellhead Leak Repairs

Forecast Methodology:

Labor - Zero-Based

There are approximately 4 workover rig wellhead leak repairs per year at an approximate cost of \$450k each. The individual project costs vary from well to well and field to field due to the fact that this work depends on the actual depth of the well being repaired. The labor portion of this estimate is based on five years of recorded experience.

Non-Labor - Zero-Based

There are approximately 4 workover rig wellhead leak repairs per year at an approximate cost of \$450k each. The individual project costs vary from well to well and field to field due to the fact that this work depends on the actual depth of the well being repaired. The non-labor portion of this estimate is based on five years of recorded experience.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412C**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 3. Wellhead Leak Repairs
 Workpaper Group: 00412C - Wellhead Leak Repairs
 Workpaper Detail: 00412C.001 - Wellhead Capital Maintenance - Multiple storage fields
 In-Service Date: Not Applicable
 Description:

Gas Storage - Wells.

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		52	52	52
Non-Labor		1,755	1,755	1,755
NSE		0	0	0
	Total	1,807	1,807	1,807
FTE		0.4	0.4	0.4

Note: Totals may include rounding differences.

**Beginning of Workpaper Group
00412D - Innerstring Installations**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 4. Well Inner-string Installations
 Workpaper Group: 00412D - Innerstring Installations

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	51	51	51
Non-Labor	Zero-Based	0	0	0	0	0	1,656	1,656	1,656
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	1,707	1,707	1,707
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5

Business Purpose:

Required installation of smaller sized casing due to a production casing failure in a storage well. The production casing in the well has reached its useful life and the innerstring may extend the useful life of a given well depending on the mechanical condition of the well.

Physical Description:

Perform necessary replacement and upgrade of leaking and damaged production casing located within storage wells located throughout the storage fields. The cost includes the material and services required to remove, and instal each innerstring and return the well to service.

Project Justification:

These are necessary innerstring installations due to aging or damaged storage wells. The well must be removed from service and secured pending the innerstring installation. The well will be unavailable for withdrawal or injection capacity until the work is completed.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 4. Well Inner-string Installations
Workpaper Group: 00412D - Innerstring Installations

Forecast Methodology:

Labor - Zero-Based

There are approximately 2 workover rig innerstring installations per year at a approximate cost of \$850k each. The individual project costs vary from well to well and field to field due to the fact that the work depends on the actual depth of the well being repaired. The labor portion of this estimate is based on five years of recorded costs in this BC.

Non-Labor - Zero-Based

There are approximately 2 workover rig innerstring installations per year at a approximate cost of \$850k each. The individual project costs vary from well to well and field to field due to the fact that the work depends on the actual depth of the well being repaired. The non-labor portion of this estimate is based on five years of recorded costs in this BC.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412D**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 4. Well Inner-string Installations
 Workpaper Group: 00412D - Innerstring Installations
 Workpaper Detail: 00412D.001 - Wells - Capital repairs & upgrades - multiple sites.
 In-Service Date: Not Applicable
 Description:

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		51	51	51
Non-Labor		1,656	1,656	1,656
NSE		0	0	0
	Total	<u>1,707</u>	<u>1,707</u>	<u>1,707</u>
FTE		0.5	0.5	0.5

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412E - Wells - Submersible Pump Replacements

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 5. Submersible Pump Installations
 Workpaper Group: 00412E - Wells - Submersible Pump Replacements

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	16	16	16
Non-Labor	Zero-Based	0	0	0	0	0	536	536	536
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	552	552	552
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1

Business Purpose:

Required replacement of existing electric submersible pumps in various storage wells. These pumped wells are required for use for storage reservoir management and the pumps typically require replacement on a 1-4 year cycle depending on the well.

Physical Description:

Perform necessary replacement of a failed ESP in a storage well located throughout the storage fields. The cost includes the material and services required to remove, and install each ESP and return the well to service.

Project Justification:

These are necessary ESP replacements as they are typically used for liquids production and storage reservoir management. If not done there is risk of either reservoir storage capacity damage and/or lack of storage capacity expansion in some instances.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 5. Submersible Pump Installations
Workpaper Group: 00412E - Wells - Submersible Pump Replacements

Forecast Methodology:

Labor - Zero-Based

There are approximately 2 workover rig ESP replacements per year at a approximate cost of \$275k each. The individual project costs vary from well to well and field to field due to the fact that the work depends on the actual depth of the ESP being replaced. The labor portion of this estimate is based on five years of recorded costs in this BC.

Non-Labor - Zero-Based

There are approximately 2 workover rig ESP replacements per year at a approximate cost of \$275k each. The individual project costs vary from well to well and field to field due to the fact that the work depends on the actual depth of the ESP being replaced. The non- labor portion of this estimate is based on five years of recorded costs in this BC.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412E**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 5. Submersible Pump Installations
 Workpaper Group: 00412E - Wells - Submersible Pump Replacements
 Workpaper Detail: 00412E.001 - Wells - ESP Replacements
 In-Service Date: 12/31/2016
 Description:

Gas Storage - Wells

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		16	16	16
Non-Labor		536	536	536
NSE		0	0	0
	Total	552	552	552
FTE		0.1	0.1	0.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412F - Well Stimulations/Re-perforations

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 6. Well Simulations
 Workpaper Group: 00412F - Well Stimulations/Re-perforations

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	5	5	5
Non-Labor	Zero-Based	0	0	0	0	0	171	171	171
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	176	176	176
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1

Business Purpose:

Required stimulation or re-perforation of an existing storage well due to poor deliverability. Storage wells may from time to time experience minor productivity damage which can be restored via this method.

Physical Description:

Perform necessary storage well stimulations and/or re-perforations located throughout the storage fields. The cost includes the material and services required to stimulate or re-perforate a well and return the well to service. Stimulations typically involve breaking up the strata surrounding the lower reaches of the well shaft in order to facilitate injection or withdrawal of stored natural gas. Re-perforations entail opening the injection/withdrawal ports in the well shaft that have become clogged typically by imbedded sedimentary material.

Project Justification:

These storage well stimulation/reperforations are required where applicable in order to improve and/or restore the productivity of a given well.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 6. Well Simulations
Workpaper Group: 00412F - Well Stimulations/Re-perforations

Forecast Methodology:

Labor - Zero-Based

There is typically one Stimulation/Reperforation project per year at an approximate cost of \$175k. The individual project cost may vary from well to well and field to field due to the fact that the work depends on the depth of the well being stimulated or reperforated. The labor portion of this estimate is based on five years recorded experience in this BC.

Non-Labor - Zero-Based

There is typically one Stimulation/Reperforation project per year at an approximate cost of \$175k. The individual project cost may vary from well to well and field to field due to the fact that the work depends on the depth of the well being stimulated or reperforated. The non- labor portion of this estimate is based on five years recorded experience in this BC.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412F**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 6. Well Simulations
 Workpaper Group: 00412F - Well Stimulations/Re-perforations
 Workpaper Detail: 00412F.001 - Wells - Simulation/Reperforations
 In-Service Date: 08/31/2016

Description:

Gas Storage - Wells.

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		5	5	5
Non-Labor		171	171	171
NSE		0	0	0
	Total	176	176	176
FTE		0.1	0.1	0.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412G - Well Gravel Packs

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 7. Well Gravel packs
 Workpaper Group: 00412G - Well Gravel Packs

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	107	107	107
Non-Labor	Zero-Based	0	0	0	0	0	3,608	3,608	3,608
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	3,715	3,715	3,715
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.9

Business Purpose:

Required re-gravel packing of an existing storage well due to a failed existing gravel pack. Gravel packs are required to prevent the production of formation sand from a storage well. It is not uncommon for gravel packs to fail over time due to normal injection and withdrawal activities during a given year. If a well is flowed with a failed gravel pack for an extended period of time, the well surface piping will be eroded and cause a major safety hazard. In addition, gas flows will be restricted if a well has a failed gravel pack.

Physical Description:

Perform the necessary replacement of a failed gravel pack from an existing well. The cost will include the materials and services required to remove, sidetrack the well and install a new gravel pack completion in the well and return the well to service.

Project Justification:

If a well has a failed gravel pack it is in an unsafe condition to be flowed and will remain out of service until the well is regravelpacked. The subject well will be unavailable for withdrawal resulting in loss of withdrawal capacity at a given field.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 7. Well Gravel packs
Workpaper Group: 00412G - Well Gravel Packs

Forecast Methodology:

Labor - Zero-Based

There are approximately two planned regravels planned in a given year at an approximate cost of \$1.85 million each. The individual projects cost may vary from well to well and field to field depending on the actual depth and mechanical condition of the subject well. The labor portion of this estimate is based on five years experience in this BC.

Non-Labor - Zero-Based

There are approximately two planned regravels planned in a given year at an approximate cost of \$1.85 million each. The individual projects cost may vary from well to well and field to field depending on the actual depth and mechanical condition of the subject well. The non-labor portion of this estimate is based on five years experience in this BC.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412G**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 7. Well Gravel packs
 Workpaper Group: 00412G - Well Gravel Packs
 Workpaper Detail: 00412G.001 - Wells - Multiple sites - re-gravel packs
 In-Service Date: 12/31/2016
 Description:

Gas Storage - Wells

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		107	107	107
Non-Labor		3,608	3,608	3,608
NSE		0	0	0
	Total	3,715	3,715	3,715
FTE		0.9	0.9	0.9

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412H - Well Re-drills

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 8. Well Re-drills
 Workpaper Group: 00412H - Well Re-drills

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	64	58	0
Non-Labor	Zero-Based	0	0	0	0	0	2,145	1,950	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	2,209	2,008	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0

Business Purpose:

Required relocation of a storage well's bottom-hole location due to poor or low deliverability. It is not uncommon for a storage well to experience declining or poor deliverability with age.

Physical Description:

Perform the necessary redrill of an existing, poor performing storage well. The well would have to be in sound mechanical condition in order to be a candidate for this work. The cost will include the materials and services to plug back, redrill the existing well to the new target and return the well to service.

Project Justification:

If a storage well has poor deliverability and the well is not redrilled, the well will likely become a high operating cost/low productivity asset and may contribute to gas sendout shortages causing undue curtailment of interruptible customers.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 8. Well Re-drills
Workpaper Group: 00412H - Well Re-drills

Forecast Methodology:

Labor - Zero-Based

There are approximately two (2) planned storage well redrills planned at an approximate cost of \$2.0-\$2.2 million each. The individual projects cost may vary from well to well and field to field depending on the actual depth and mechanical condition of the subject well. The labor portion of this estimate is based on five years' recorded costs in this BC.

Non-Labor - Zero-Based

There are approximately two (2) planned storage well redrills planned in at an approximate cost of \$2.0-\$2.2 million each. The individual projects cost may vary from well to well and field to field depending on the actual depth and mechanical condition of the subject well.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412H**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 8. Well Re-drills
 Workpaper Group: 00412H - Well Re-drills
 Workpaper Detail: 00412H.001 - Storage Well - Redrills

In-Service Date: 09/30/2014

Description:

Gas Storage - Wells.

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		64	58	0
Non-Labor		2,145	1,950	0
NSE		0	0	0
	Total	2,209	2,008	0
FTE		0.5	0.5	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412J - Well Replacements

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 9. Replacement Wells
 Workpaper Group: 00412J - Well Replacements

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	296	302	528
Non-Labor	Zero-Based	0	0	0	0	0	9,945	10,140	17,745
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	10,241	10,442	18,273
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	2.5	2.6	4.5

Business Purpose:

Required replacement of seven (7) existing aging storage wells and their associated deliverability lost due to well abandonments. The replacement storage wells will be drilled in the 2014-2016 time frame to replace mechanically unsound high-operating-cost injection/withdrawal wells that have been abandoned or are planned to be abandoned.

Physical Description:

Perform the necessary replacement of seven (7) existing aging wells due to required well abandonments and their associated loss of required deliverability. These projects will locate, drill and complete new replacement storage injection/withdrawal wells to be strategically located through out the Storage Fields. The cost of each well includes the necessary, services and materials to complete each well. The anticipated numbers and the locations of the replacement wells are the following: 2014 - 2 Aliso Canyon Storage Wells; 2015 - 2 Goleta Storage Wells; 2016 - 3 - Aliso Canyon Storage Wells.

Project Justification:

New wells are necessary to replace lost deliverability due to failed gravel packs or other situations causing poor deliverability rates from a number of wells. In addition, lost withdrawal capacity at lower storage inventories must be recaptured at Aliso Canyon to ensure reliability and meet customer demands. Remediation of inefficient storage wells typically requires high cost repairs and/or repeated re-gravel packing due to highly erosive sand production. Gravel packs for wells typically cost from \$1.8 million - \$2.2 million each. Phasing in new higher deliverability replacement wells and eliminating the high cost aging wells will improve operations by reducing costly casing repairs and gravel pack projects. Replacement wells are also planned for Goleta that will allow for the abandonment of the remote UCSB college site and the pipeline serving this location.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 9. Replacement Wells
Workpaper Group: 00412J - Well Replacements

Forecast Methodology:

Labor - Zero-Based

There are a total of Seven (7) planned new replacement wells located among the Aliso Canyon and the La Goleta Storage Fields that will vary in cost but average approximately \$5.57MM each. These replacement wells will be a higher productivity more modern design compared to the old wells that are being replaced. The actual cost of each well may vary slightly as the costs are dependent on the actual required depth to be drilled for each well. The costs are based on historical well drilling costs in addition to recent vendor cost estimates. The labor portion of project costs is estimated at the same rate as the average of five years of recorded experience in this BC.

Non-Labor - Zero-Based

There are a total of seven (7) planned new replacement wells located among the Aliso Canyon and the La Goleta Storage Fields that will vary in cost but average approximately \$5.57MM each. These replacement wells will be a higher productivity more modern design compared to the old wells that are being replaced. The actual cost of each well may vary slightly as the costs are dependent on the actual required depth to be drilled for each well. The costs are based on historical well drilling costs in addition to recent vendor cost estimates.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412J**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 9. Replacement Wells
 Workpaper Group: 00412J - Well Replacements
 Workpaper Detail: 00412J.001 - Replacement Storage Wells

In-Service Date: Not Applicable

Description:

Gas Storage - Wells

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		296	302	528
Non-Labor		9,945	10,140	17,745
NSE		0	0	0
	Total	10,241	10,442	18,273
FTE		2.5	2.6	4.5

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412N - Well Plug & Abandonments

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 10. Plug & Abandon Wells
 Workpaper Group: 00412N - Well Plug & Abandonments

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	112	179	135
Non-Labor	Zero-Based	0	0	0	0	0	3,764	6,016	4,553
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	3,876	6,195	4,688
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.0	1.5	1.2

Business Purpose:

The required abandonment of aging, mechanically unsound wells which are beyond their useful lives; the abandonment of aging storage wells located in environmentally sensitive areas or high public risk areas.

Physical Description:

Perform the necessary plugging and abandonment of approximately twenty-six (26) existing mechanically unsound or unproductive storage wells or aging wells located in environmentally sensitive areas located throughout the storage fields. The cost includes the material and services required to plug and abandon the selected wells in a manner that meets or exceeds the CA DOGGR requirements.

Project Justification:

These are required well abandonments that are becoming more frequent as various storage wells reach or exceed their useful life in a given field. These subject wells become high risk/high operating cost assets due to their poor or declining mechanical integrity or their complete lack of productivity due to their age. A portion of the well abandonments are required for the purpose of removing the storage facility well operations from environmentally sensitive areas or higher public risk areas and relocating the storage wells within the storage field station boundaries.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 10. Plug & Abandon Wells
Workpaper Group: 00412N - Well Plug & Abandonments

Forecast Methodology:

Labor - Zero-Based

There are approximately 26 wells total planned for abandonment among the existing storage fields at an approximate cost of \$600K each. The individual well abandonment costs will vary depending on the condition of the well at the time of the abandonment, surface location of the well, as well as the depth of the well to be abandoned. The labor portion of costs is estimated at the average content over the most recent five recorded years in this BC.

Non-Labor - Zero-Based

There are approximately 26 wells total planned for abandonment among the existing storage fields at an approximate \$600K each. The individual well abandonment costs will vary depending on the condition of the well at the time of the abandonment, surface location of the well, as well as the depth of the well to be abandoned.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412N**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 10. Plug & Abandon Wells
 Workpaper Group: 00412N - Well Plug & Abandonments
 Workpaper Detail: 00412N.001 - Wells - Plug & Abandon wells
 In-Service Date: Not Applicable

Description:

Gas Storage - Wells.

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		112	179	135
Non-Labor		3,764	6,016	4,553
NSE		0	0	0
	Total	3,876	6,195	4,688
FTE		1.0	1.5	1.2

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412W - Gas Storage - Wells - Blanket projects

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 11. Gas Storage - Wells - Blanket projects
 Workpaper Group: 00412W - Gas Storage - Wells - Blanket projects

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
	Years								
Labor	Zero-Based	0	0	0	0	0	28	33	24
Non-Labor	Zero-Based	0	0	0	0	0	946	1,092	800
NSE	Zero-Based	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	974	1,125	824
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2

Business Purpose:

This Budget Code includes costs associated with drilling and work-over of storage wells used for the injection and withdrawal of natural gas from underground storage facilities, including wells used for liquid production and observation. Some of the costs covered in this Budget Code are for drilling and work-over of rig services, cementing and gravel packing, services, packers, casing, tubing, safety valves, and well control systems.

Physical Description:

Perform necessary capital well restorations at the various storage fields to address safety, improve reliability and maintain the required capacities at each storage field.

Recorded and planned costs in this work paper include those in budget codes 402, 412 and 422. Individual projects in this budget code will vary from as low as \$10,000 to as high as several hundreds of thousands of dollars and include shallow zone work in the Aliso Canyon field, projects related to geology and storage engineering, and smaller technology upgrades.

Project Justification:

Repair well leakage and replace lost capacity due to the ongoing decline in deliverability. Ongoing improvements and repairs are required to maintain withdrawal and injection capacity.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 11. Gas Storage - Wells - Blanket projects
Workpaper Group: 00412W - Gas Storage - Wells - Blanket projects

Forecast Methodology:

Labor - Zero-Based

Labor content is based on the last five years' recorded costs in this BC.

Non-Labor - Zero-Based

This estimate is the sum of several smaller projects. Such items are based on needs related to storage wells and not large enough to be listed separately.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412W**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 11. Gas Storage - Wells - Blanket projects
 Workpaper Group: 00412W - Gas Storage - Wells - Blanket projects
 Workpaper Detail: 00412W.001 - Gas Storage - Wells - Blanket projects
 In-Service Date: Not Applicable
 Description:

Gas Storage - Wells

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		28	33	24
Non-Labor		946	1,092	800
NSE		0	0	0
	Total	974	1,125	824
FTE		0.2	0.3	0.2

Note: Totals may include rounding differences.

**Beginning of Workpaper Group
00412V - Cushion Gas Purchase**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 12. Cushion Gas Purchase
 Workpaper Group: 00412V - Cushion Gas Purchase

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	0	0	0	0	0	0	0	0
NSE	Zero-Based	0	0	0	0	0	1,398	1,398	0
Total		0	0	0	0	0	1,398	1,398	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

"Cushion" gas, also known as "Base" gas is the volume of gas intended as permanent inventory in a storage reservoir to maintain adequate pressure and deliverability rates throughout the withdrawal season.

Physical Description:

Purchase of a volume of natural gas intended to remain in the well to maintain adequate withdrawal rates during peak season. Purchases in 2014 and 2015 are needed to support the approved expansion of the Honor Rancho storage field

Project Justification:

Although the costs related to the Honor Rancho expansion (BCAP) were the subject of a CPUC proceeding other than GRC, these specific purchases were directed to be provided for in the 2016TY GRC in Decision 10-04-034.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 12. Cushion Gas Purchase
Workpaper Group: 00412V - Cushion Gas Purchase

Forecast Methodology:

Labor - Zero-Based

None.

Non-Labor - Zero-Based

Cost is to purchase 300MMCF using a BTU conversion factor of 1.0235 giving 307.05MDth at \$4.55 per Dth.

NSE - Zero-Based

This purchase should receive special consideration with respect to escalation as it is not a typical capital asset.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412V**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 12. Cushion Gas Purchase
 Workpaper Group: 00412V - Cushion Gas Purchase
 Workpaper Detail: 00412V.001 - Cushion Gas Purchass

In-Service Date: 06/30/2015

Description:

Gas Storage - Wells

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		0	0	0
Non-Labor		0	0	0
NSE		1,398	1,398	0
	Total	1,398	1,398	0
FTE		0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412U - Storage Integrity Management Program (SIMP)

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 13. STORAGE INTEGRITY MANAGEMENT PROGRAM (SIMP)
 Workpaper Group: 00412U - Storage Integrity Management Program (SIMP)

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	58	73	701
Non-Labor	Zero-Based	0	0	0	0	0	1,950	2,437	23,571
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	2,008	2,510	24,272
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.5	0.6	6.5

Business Purpose:

In contrast to the reactive capital work described elsewhere in this Budget Category, the Storage Integrity Management Program (SIMP) is intended to proactively identify, diagnose, and mitigate potential safety and/or integrity problems associated with gas storage wells. It is important to distinguish that SIMP is incremental work above and beyond the levels traditionally performed. Additional inspection of existing aging storage wells and their associated well head piping located throughout the storage fields is essential in order to determine and monitor their current mechanical integrity. SIMP is a proactive, methodical, and structured approach using advanced inspection technologies such as ultra-sonic and neutron type casing logs along with risk management disciplines to address well integrity issues before they result in unsafe conditions for employees or the public, or become major incidents, is a prudent operating practice. Safety and/or integrity conditions that are presently unknown may exist within the high pressure (up to 3,600 psig) above ground pipe laterals and below ground facilities that comprise of 229 aging gas storage field wells that can exceed 13,000 feet in depth. Some SoCalGas wells are more than 75 years old while the average age of all Storage wells is 52 years. In addition, some SoCalGas wells are located within close proximity to many residential dwellings.

Physical Description:

All well work to be performed will be dependent on the site-specific conditions found at the time work is initiated. While average costs were utilized to prepare initial forecasts for SIMP, actual conditions and the scale of work to be performed can only be determined after the well is actually entered with inspection devices and/or repair tools. Given the fact that many of the wells have not been worked on in recent years, and the mature age of some wells, major problems and fixes of unknown costs can be anticipated. Work would most likely consist of:

- Wellhead Valve Replacements
- Well Tubing Replacements
- Wellhead Leak Repairs
- Well Inner-string Replacements

Project Justification:

These are required inspections in order to identify any acceleration in the decline of the existing aging wells and well head piping/laterals located within the all the storage fields. Funding to begin the replacement program in earnest begins in 2016. Past work on well Frew 3 at Aliso Canyon in 2013 is a good example of the wide variability in mitigation costs. Frew 3 was originally targeted for a tubing leak repair scheme estimated to cost approximately \$583,000. Once the well was entered and repairs began, the wellbore was found to be compromised due to shifting geological formations requiring extensive work. The net result was a decision to abandon the well at a cost of \$1.39 million, more than double the original repair estimate.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00412.0
Category: C. Wells
Category-Sub: 13. STORAGE INTEGRITY MANAGEMENT PROGRAM (SIMP)
Workpaper Group: 00412U - Storage Integrity Management Program (SIMP)

Forecast Methodology:

Labor - Zero-Based

Labor totaling 6.5 FTEs to support the program consists of two Contract Administrators for Aliso Canyon, and one each for the remaining three fields, one Project Manager, and 0.5 clerical support.

Non-Labor - Zero-Based

The forecast method used for the SIMP capital work is zero based. This approach is most appropriate because it is an incremental program. The costs per units of work are based on historical averages, and support labor needs are based on experience. However, well repair methods will be based upon assessment findings and optimized among the options described in the Capital Costs Section C-Wells of my testimony. Unit costs based on historical prices of similar type work for the mitigation work would most likely consist of:

- Wellhead Valve Replacements
- Well Tubing Replacements
- Wellhead Leak Repairs
- Well Inner-string Replacements

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00412U**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 13. STORAGE INTEGRITY MANAGEMENT PROGRAM (SIMP)
 Workpaper Group: 00412U - Storage Integrity Management Program (SIMP)
 Workpaper Detail: 00412U.001 - Wells - Storage Integrity Management Program - SIMP - 2014 Costs
 In-Service Date: Not Applicable
 Description:

Gas Storage - Wells.

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		58	0	0
Non-Labor		1,950	0	0
NSE		0	0	0
	Total	2,008	0	0
FTE		0.5	0.0	0.0

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 13. STORAGE INTEGRITY MANAGEMENT PROGRAM (SIMP)
 Workpaper Group: 00412U - Storage Integrity Management Program (SIMP)
 Workpaper Detail: 00412U.002 - Wells - Storage Integrity Management Program - SIMP - 2015 Costs
 In-Service Date: Not Applicable
 Description:

Gas Storage - Wells

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		0	73	0
Non-Labor		0	2,437	0
NSE		0	0	0
	Total	0	2,510	0
FTE		0.0	0.6	0.0

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00412.0
 Category: C. Wells
 Category-Sub: 13. STORAGE INTEGRITY MANAGEMENT PROGRAM (SIMP)
 Workpaper Group: 00412U - Storage Integrity Management Program (SIMP)
 Workpaper Detail: 00412U.003 - Wells - Storage Integrity Management Program - SIMP - 2016 Costs
 In-Service Date: Not Applicable
 Description:

Gas Storage - Wells

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		0	0	701
Non-Labor		0	0	23,571
NSE		0	0	0
	Total	0	0	24,272
FTE		0.0	0.0	6.5

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Category: D. Pipelines
Workpaper: VARIOUS

Summary for Category: D. Pipelines

	In 2013\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2013	2014	2015	2016
Labor	0	479	737	361
Non-Labor	0	6,067	9,346	4,570
NSE	0	0	0	0
Total	0	6,546	10,083	4,931
FTE	0.0	5.0	7.6	3.7

00413A Aliso Canyon Valve Replacements

Labor	0	65	65	50
Non-Labor	0	824	824	638
NSE	0	0	0	0
Total	0	889	889	688
FTE	0.0	0.7	0.7	0.5

00413B Aliso Pipe Bridge replacment

Labor	0	37	185	0
Non-Labor	0	468	3,341	0
NSE	0	0	0	0
Total	0	505	3,526	0
FTE	0.0	0.4	1.9	0.0

00413D Aliso Injection System de-bottlenecking

Labor	0	0	37	37
Non-Labor	0	0	468	468
NSE	0	0	0	0
Total	0	0	505	505
FTE	0.0	0.0	0.4	0.4

00413E Aliso Canyon - Piping Improvements

Labor	0	96	11	37
Non-Labor	0	1,217	141	468
NSE	0	0	0	0
Total	0	1,313	152	505
FTE	0.0	1.0	0.1	0.4

00413K Playa del Rey - Withdrawal de-bottlenecking

Labor	0	37	185	0
Non-Labor	0	468	2,341	0
NSE	0	0	0	0
Total	0	505	2,526	0
FTE	0.0	0.4	1.9	0.0

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Category: D. Pipelines
Workpaper: VARIOUS

In 2013\$ (000)			
Adjusted-Recorded	Adjusted-Forecast		
2013	2014	2015	2016

00413L Gas Storage - Pipelines - Blanket projects

Labor	0	244	254	237
Non-Labor	0	3,090	2,231	2,996
NSE	0	0	0	0
Total	0	3,334	2,485	3,233
FTE	0.0	2.5	2.6	2.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00413A - Aliso Canyon Valve Replacements

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 1. Aliso Canyon Valve Replacements
 Workpaper Group: 00413A - Aliso Canyon Valve Replacements

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	65	65	50
Non-Labor	Zero-Based	0	0	0	0	0	824	824	638
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	889	889	688
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.5

Business Purpose:

Station valve replacement program was established to replace valves throughout the year. Valve replacement is dependent on availability of line shut-in and valve condition.

Physical Description:

Various sized valves 2 inches and larger of varying pressure ratings for use at the well sits and plants. Estimate an average costs of \$20,000/valve. (Valves 2" to 16" vary in cost from approx. \$1k to \$65k each).

Project Justification:

Many valves (block, well site, safety, etc) in the Storage Field are leaking and new ones are equal to or less than the cost to repair. This project will replace approximately 5% of the larger field valves every year (e.g., replace valves approximately every 20 years). This project will continue in each year after the GRC cycle.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00413.0
Category: D. Pipelines
Category-Sub: 1. Aliso Canyon Valve Replacements
Workpaper Group: 00413A - Aliso Canyon Valve Replacements

Forecast Methodology:

Labor - Zero-Based

Cost based on pervious five years' labor cost in this BC.

Non-Labor - Zero-Based

Cost based on pervious years' material cost.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00413A**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 1. Aliso Canyon Valve Replacements
 Workpaper Group: 00413A - Aliso Canyon Valve Replacements
 Workpaper Detail: 00413A.001 - Storage - Valve replacements in Aliso Canyon
 In-Service Date: Not Applicable
 Description:

Gas Storage - Pipelines.

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		65	65	50
Non-Labor		824	824	638
NSE		0	0	0
	Total	889	889	688
FTE		0.7	0.7	0.5

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00413B - Aliso Pipe Bridge replacment

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 2. Aliso Canyon Pipe Bridge replacment P30 to FF38
 Workpaper Group: 00413B - Aliso Pipe Bridge replacment

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	37	185	0
Non-Labor	Zero-Based	0	0	0	0	0	468	3,341	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	505	3,526	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.4	1.9	0.0

Business Purpose:

This project will relocate an existing pipe rack out of a ravine area with an active landslide and soil erosion that is threatening several existing pipe supports. The loss of this pipe rack would results in loss of approximately 635 MMSCFD of withdrawal capability, and the impact on injection capability is unknown.

Physical Description:

This project will remove existing pipe from a ravine with an active landslide in one area and extensive erosion in another area. A new pipe bridge will be installed across the ravine. New pipe will be installed in the bridge and will be connected to existing pipes on each side. Replacements supports may include new pipeline bridge across the canyon or pipeline supports along roadway.

Project Justification:

Failure of pipe and supports in this ravine could result in the loss of use of 21 wells in Aliso Canyon's east field. the approximate combined withdrawal capacity of wells is 635 MMSCFD. the total injection capacity of wells is unknown. Rupture of pipes in the ravine could result in the release of crude oil and brine water into the flowing stream at the bottom of the ravine.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00413.0
Category: D. Pipelines
Category-Sub: 2. Aliso Canyon Pipe Bridge replacment P30 to FF38
Workpaper Group: 00413B - Aliso Pipe Bridge replacment

Forecast Methodology:

Labor - Zero-Based

The project costs were estimated by engineering team by obtaining budgetary estimates from structural steel fabricators and installation contractors and apply a contingency factor. The labor portion of the estimate is based on five years of recorded costs in this BC.

Non-Labor - Zero-Based

The project costs were estimated by engineering team by obtaining budgetary estimates from structural steel fabricators and installation contractors and apply a contingency factor. The non- labor portion of the estimate is based on five years of recorded costs in this BC.

NSE - Zero-Based

None. These are Gas Storate capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00413B**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 2. Aliso Canyon Pipe Bridge replacment P30 to FF38
 Workpaper Group: 00413B - Aliso Pipe Bridge replacment
 Workpaper Detail: 00413B.001 - Storage - Pipelines - Replace Pipe bridge in Aliso Canyon
 In-Service Date: 09/30/2015

Description:

Gas Storage - Pipelines.

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		37	185	0
Non-Labor		468	3,341	0
NSE		0	0	0
	Total	505	3,526	0
FTE		0.4	1.9	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00413D - Aliso Injection System de-bottlenecking

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 3. Aliso Canyon Injection System de-bottlenecking
 Workpaper Group: 00413D - Aliso Injection System de-bottlenecking

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	0	37	37
Non-Labor	Zero-Based	0	0	0	0	0	0	468	468
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	0	505	505
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4

Business Purpose:

The project will improve the injection and withdrawal capacities of the Aliso Canyon Storage Field. With projects such as Aliso Canyon Turbine Replacement (ACTR) and the well replacements, the system piping needs to be studied to eliminate piping sections which restrict the flow go as to and from the storage wells.

Physical Description:

This project will replace existing smaller diameter pipe with larger diameter pipe with the installation of pipe field supports. Exact size of pipe is currently being determined and will be sufficient to meet the field's withdrawal limits. Facilities installations will consist of pipe, pipe fittings, and pipe supports.

Project Justification:

Through the evolution of the storage field, piping restrictions were inadvertently installed. This project will help address these pipe sections and allow for more efficient use of the field during increased injection offered by the ACTR and the well replacement projects. If replacement is not completed, the station will not have pipe capacity to reach the well at the maximum rate of injection nor withdrawal at max capacity of the upgrade dehydration plants.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00413.0
Category: D. Pipelines
Category-Sub: 3. Aliso Canyon Injection System de-bottlenecking
Workpaper Group: 00413D - Aliso Injection System de-bottlenecking

Forecast Methodology:

Labor - Zero-Based

Costs based on pervious projects and current contract daily rates. Labor is estimated using the last five years recorded costs in this BC.

Non-Labor - Zero-Based

Costs based on pervious projects and current contract daily rates.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00413D**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 3. Aliso Canyon Injection System de-bottlenecking
 Workpaper Group: 00413D - Aliso Injection System de-bottlenecking
 Workpaper Detail: 00413D.001 - Storage Pipelines - Aliso Injection system de-bottlenecking
 In-Service Date: 09/30/2016
 Description:

Gas Storage - Pipelines.

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		0	37	37
Non-Labor		0	468	468
NSE		0	0	0
	Total	0	505	505
FTE		0.0	0.4	0.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00413E - Aliso Canyon - Piping Improvements

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 4. Aliso Canyon - Kill Safety Sysstem, Master Lease F
 Workpaper Group: 00413E - Aliso Canyon - Piping Improvements

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	96	11	37
Non-Labor	Zero-Based	0	0	0	0	0	1,217	141	468
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	1,313	152	505
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.0	0.1	0.4

Business Purpose:

This project will complete a well kill system in the field that can be accessed from a remote location. This project will provide cleaner source of motive gas needed throughout the field for well safety and non-safety equipment. Existing system relies on unconditioned gas from the field withdrawal piping.

This project will replace the liquid pipelines that have experienced significant wall loss. Replacement is needed to maintain liquid removal from MRU, Dehy 3 and LP compressor area.

Physical Description:

Pipe and isolation valves to be installed at well locations and at identified remote well kill locations. Pipe supports will be installed as necessary.

Installation of field utility gas system (Master Lease Gas), and replacement of high pressure liquid handling pipelines.

Piping and pipe supports will be installed to wellsite and identified locations where clean gas is required.

Pipelines from the gathering plant to the DEHY 3 site will be replaced. Pipe supports and trenches will be installed as necessary.

Project Justification:

The liquid handling pipelines are critical to liquid removal from the High Pressure system. The high pressure system transports, cleans, and meters gas from the daily operations of the entire facility.

Equipment in the field requires clean motive gas. This gas will operate safety and non-safety related equipment. If the liquid handling pipelines were to fail, gas deliveries may be significantly impacted or sent through metering without complying with standards for water content in pipeline-quality natural gas.

If the HP liquid handling pipelines were to fail, the HP gas may be sent through metering without complying with federal, state and local codes and standards for water content in pipeline-quality natural gas.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00413.0
Category: D. Pipelines
Category-Sub: 4. Aliso Canyon - Kill Safety Sysstem, Master Lease F
Workpaper Group: 00413E - Aliso Canyon - Piping Improvements

Forecast Methodology:

Labor - Zero-Based

Cost based on pervious project costs and current contract daily rates. Labor portion is based on the last five years' recorded costs.

Non-Labor - Zero-Based

Cost based on pervious project costs and current contract daily rates.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00413E**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 4. Aliso Canyon - Kill Safety System, Master Lease F
 Workpaper Group: 00413E - Aliso Canyon - Piping Improvements
 Workpaper Detail: 00413E.001 - Storage Pipelines - Multiple large projects in Aliso Canyon.
 In-Service Date: Not Applicable

Description:

Gas Storage - Pipelines.

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		96	11	37
Non-Labor		1,217	141	468
NSE		0	0	0
	Total	<u>1,313</u>	<u>152</u>	<u>505</u>
FTE		1.0	0.1	0.4

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00413K - Playa del Rey - Withdrawal de-bottlenecking

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 5. Playa del Rey - Withdrawal de-bottlenecking
 Workpaper Group: 00413K - Playa del Rey - Withdrawal de-bottlenecking

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	37	185	0
Non-Labor	Zero-Based	0	0	0	0	0	468	2,341	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	505	2,526	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.4	1.9	0.0

Business Purpose:

This project will help recapture the withdrawal capacity lost due to the elimination of the use of the compressor area withdrawal equipment. Withdrawal piping resizing and equipment upgrade is necessary to maintain field withdrawal capacity.

Physical Description:

The work would include replacement of withdrawal equipment and installation of newly resized piping. Pipe sizes are currently being determined and will meet the field's withdrawal requirements.

Project Justification:

Due to recent operating changes to the PDR withdrawal system, the withdrawal capacity has been limited. The upgrade of the lower field equipment and piping would help recapture the lost capacity while allowing the PDR storage field to comply with federal, state and local codes and the standards for water content in pipeline-quality natural gas.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00413.0
Category: D. Pipelines
Category-Sub: 5. Playa del Rey - Withdrawal de-bottlenecking
Workpaper Group: 00413K - Playa del Rey - Withdrawal de-bottlenecking

Forecast Methodology:

Labor - Zero-Based

Labor content is based on five years recorded costs in this BC.

Non-Labor - Zero-Based

Cost estimate is based on previously completed work, vendor quotes for similar equipment and current contractor daily rates.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00413K**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 5. Playa del Rey - Withdrawal de-bottlenecking
 Workpaper Group: 00413K - Playa del Rey - Withdrawal de-bottlenecking
 Workpaper Detail: 00413K.001 - Playa del Rey - Withdrawal bebottlenecking
 In-Service Date: 09/30/2015

Description:

Gas Storage - Pipelines

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		37	185	0
Non-Labor		468	2,341	0
NSE		0	0	0
	Total	<u>505</u>	<u>2,526</u>	<u>0</u>
FTE		0.4	1.9	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00413L - Gas Storage - Pipelines - Blanket projects

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 6. Gas Storage - Pipelines - Blanket projects
 Workpaper Group: 00413L - Gas Storage - Pipelines - Blanket projects

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	244	254	237
Non-Labor	Zero-Based	0	0	0	0	0	3,090	2,231	2,996
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	3,334	2,485	3,233
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	2.5	2.6	2.4

Business Purpose:

This Budget Code includes costs of pipelines used in the underground storage fields. Included are the costs associated with the pipe, valves, actuators, fittings, vaults, supports, cathodic protection equipment, and related instrumentation and controls for these components.

Physical Description:

Perform necessary pipeline replacements, installations, relocations, abandonment and upgrades at the various storage fields to address safety, maintain or improve reliability, meet regulatory and environmental requirements and to meet the required capacities of the various piping system.

This work paper provides for multiple smaller projects in the various storage fields not qualifying for their own work papers due to size. Projects represented here may vary from a low as a few thousand dollars to as high as several hundreds of thousands of dollars.

Project Justification:

This series of budget categories provides funding to perform necessary pipeline maintenance, replacements, relocations and upgrades at the various storage fields to address safety, to maintain or improve reliability, and to meet the required capacities of the various piping systems.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00413.0
Category: D. Pipelines
Category-Sub: 6. Gas Storage - Pipelines - Blanket projects
Workpaper Group: 00413L - Gas Storage - Pipelines - Blanket projects

Forecast Methodology:

Labor - Zero-Based

Labor portion is derived from the last five years experience in this BC.

Non-Labor - Zero-Based

Cost estimates here are the sum of several smaller items. Such projects are based on the needs in the storage fields related to aging and/or undersized piping runs.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00413L**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00413.0
 Category: D. Pipelines
 Category-Sub: 6. Gas Storage - Pipelines - Blanket projects
 Workpaper Group: 00413L - Gas Storage - Pipelines - Blanket projects
 Workpaper Detail: 00413L.001 - Gas Storage - Pipelines - Blanket projects
 In-Service Date: Not Applicable

Description:

Gas Storage - Pipelines

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		244	254	237
Non-Labor		3,090	2,231	2,996
NSE		0	0	0
	Total	<u>3,334</u>	<u>2,485</u>	<u>3,233</u>
FTE		2.5	2.6	2.4

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Category: E. Purification Equipment
Workpaper: VARIOUS

Summary for Category: E. Purification Equipment

	In 2013\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2013	2014	2015	2016
Labor	0	1,143	823	823
Non-Labor	0	7,653	6,782	6,782
NSE	0	0	0	0
Total	0	8,796	7,605	7,605
FTE	0.0	10.4	7.5	7.5

00414B Aliso Canyon Dehydration Upgrades

Labor	0	132	132	132
Non-Labor	0	886	886	886
NSE	0	0	0	0
Total	0	1,018	1,018	1,018
FTE	0.0	1.2	1.2	1.2

00414E Honor Rancho Dehydration Upgrades

Labor	0	402	129	0
Non-Labor	0	2,692	863	0
NSE	0	0	0	0
Total	0	3,094	992	0
FTE	0.0	3.7	1.2	0.0

00414F Goleta Dehydration Upgrades

Labor	0	397	132	0
Non-Labor	0	2,658	886	0
NSE	0	0	0	0
Total	0	3,055	1,018	0
FTE	0.0	3.6	1.2	0.0

00414J Storage - Purification - Blanket Projects

Labor	0	212	430	691
Non-Labor	0	1,417	4,147	5,896
NSE	0	0	0	0
Total	0	1,629	4,577	6,587
FTE	0.0	1.9	3.9	6.3

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00414B - Aliso Canyon Dehydration Upgrades

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00414.0
 Category: E. Purification Equipment
 Category-Sub: 1. Aliso Canyon Dehy 2 Upgrades
 Workpaper Group: 00414B - Aliso Canyon Dehydration Upgrades

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	132	132	132
Non-Labor	Zero-Based	0	0	0	0	0	886	886	886
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	1,018	1,018	1,018
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.2

Business Purpose:

This project will upgrade the Dehy 2 withdrawal system by increasing withdrawal capability similar to that of Dehy 1. Upgrades will also increase equipment reliability and remote monitoring.

Physical Description:

This project will include the installation of new gas and glycol filters for improved gas conditioning. Instrumentation upgrades and installation will be completed to allow for Operator's to remotely monitor the equipment during operation. The site Motor Control Center (MCC) will be replaced to better support existing and new equipment.

Project Justification:

DEHY 2 currently has withdrawal capacity of 750MMSCFD. The upgrade will allow for increased withdrawal capacity of 110MMSCFD, mirroring that of Dehy 1. Without this project, the station will not be able to meet expected increases in withdrawal capacity demands as well as comply with federal, state and local codes and standards for water content in pipeline-quality natural gas.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00414.0
Category: E. Purification Equipment
Category-Sub: 1. Aliso Canyon Dehy 2 Upgrades
Workpaper Group: 00414B - Aliso Canyon Dehydration Upgrades

Forecast Methodology:

Labor - Zero-Based

The labor portion of this estimate is based on five years recorded costs in this BC.

Non-Labor - Zero-Based

Costs are based on quotes provided by vessel fabricators , equipment manufacturers, contractor estimates, and similar work completed on previous projects.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00414B**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00414.0
 Category: E. Purification Equipment
 Category-Sub: 1. Aliso Canyon Dehy 2 Upgrades
 Workpaper Group: 00414B - Aliso Canyon Dehydration Upgrades
 Workpaper Detail: 00414B.001 - Storage Purification - Aliso Dehy upgrades
 In-Service Date: Not Applicable

Description:

Gas Storage - Purification

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		132	132	132
Non-Labor		886	886	886
NSE		0	0	0
	Total	<u>1,018</u>	<u>1,018</u>	<u>1,018</u>
FTE		1.2	1.2	1.2

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00414E - Honor Rancho Dehydration Upgrades

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00414.0
 Category: E. Purification Equipment
 Category-Sub: 2. Honor Rancho Dehy Plant Improvements.
 Workpaper Group: 00414E - Honor Rancho Dehydration Upgrades

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	402	129	0
Non-Labor	Zero-Based	0	0	0	0	0	2,692	863	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	3,094	992	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	3.7	1.2	0.0

Business Purpose:

Separation of Dehy trains and installation of filters allows for flexibility of Dehy operation requiring less downtime during routine maintenance and reduction in glycol degradation.

Physical Description:

This project will include the installation of new gas and glycol filters for improved gas conditioning. The system Programmable Logic Controller (PLC) will be upgraded to meet the new operating requirements and instrumentation needs. Phase 1 includes feasibility studies, 3D modeling & analysis for equipment configuration, revised instrumentation, structural & foundation analysis; Phase 2 includes site excavation, concrete foundation, steel platform & structure, instrumentation & programming.

Project Justification:

Without this project, the station will require extended shutdowns during routine maintenance and complete shutdowns during non-routine shutdowns. This project will also allow the station to comply with federal, state and local codes and standards for water content in pipeline-quality natural gas.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00414.0
Category: E. Purification Equipment
Category-Sub: 2. Honor Rancho Dehy Plant Improvements.
Workpaper Group: 00414E - Honor Rancho Dehydration Upgrades

Forecast Methodology:

Labor - Zero-Based

The labor portion of this estimate is based on five years recorded costs in this BC.

Non-Labor - Zero-Based

Costs are based on quotes provided by vessel fabricators , equipment manufacturers, contractor estimates, and similar work completed on previous projects.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00414E**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00414.0
 Category: E. Purification Equipment
 Category-Sub: 2. Honor Rancho Dehy Plant Improvements.
 Workpaper Group: 00414E - Honor Rancho Dehydration Upgrades
 Workpaper Detail: 00414E.001 - Storage Purification - Honor Rancho Dehy improvements
 In-Service Date: 09/30/2015

Description:

Gas Storage - Purification

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		402	129	0
Non-Labor		2,692	863	0
NSE		0	0	0
	Total	3,094	992	0
FTE		3.7	1.2	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00414F - Goleta Dehydration Upgrades

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00414.0
 Category: E. Purification Equipment
 Category-Sub: 3. Goleta Dehy
 Workpaper Group: 00414F - Goleta Dehydration Upgrades

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	397	132	0
Non-Labor	Zero-Based	0	0	0	0	0	2,658	886	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	3,055	1,018	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	3.6	1.2	0.0

Business Purpose:

Dehydration upgrades are needed to improve efficiency.

Physical Description:

This project includes the installation of new gas and glycol filters, heat exchangers, glycol regeneration equipment upgrades and instrumentation for remote monitoring.

Project Justification:

This project will also allow the station to comply with federal, state and local codes and standards for water content in pipeline-quality natural gas.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00414.0
Category: E. Purification Equipment
Category-Sub: 3. Goleta Dehy
Workpaper Group: 00414F - Goleta Dehydration Upgrades

Forecast Methodology:

Labor - Zero-Based

The labor content of this estimate is based on five years experience in this BC.

Non-Labor - Zero-Based

Costs are based on quotes provided by vessel fabricators , equipment manufacturers, contractor estimates, and similar work completed on previous projects.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00414F**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00414.0
 Category: E. Purification Equipment
 Category-Sub: 3. Goleta Dehy
 Workpaper Group: 00414F - Goleta Dehydration Upgrades
 Workpaper Detail: 00414F.001 - Storage Purification - Goleta Dehy
 In-Service Date: 09/30/2015
 Description:

Gas Storage - Purification

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		397	132	0
Non-Labor		2,658	886	0
NSE		0	0	0
	Total	3,055	1,018	0
FTE		3.6	1.2	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00414J - Storage - Purification - Blanket Projects

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00414.0
 Category: E. Purification Equipment
 Category-Sub: 4. Storage - Purification - Blanket Projects
 Workpaper Group: 00414J - Storage - Purification - Blanket Projects

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	212	430	691
Non-Labor	Zero-Based	0	0	0	0	0	1,417	4,147	5,896
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	1,629	4,577	6,587
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.9	3.9	6.3

Business Purpose:

This Budget Code includes costs of equipment used primarily for the removal of impurities from, or the conditioning of, natural gas and related liquids removed from underground storage fields during withdrawal operations. Some examples of the type of equipment included in this area are dehydration systems, coolers, vessels, tanks, scrubbers, boilers, pumps, and associated valves, piping, power and instrumentation. This project provides for multiple, smaller, projects not qualifying for separate work papers.

Physical Description:

Perform necessary installations, replacements, relocations and upgrades at the various storage fields to address safety, maintain or improve reliability, meet regulatory and environmental requirements, and to meet the required capacities and specifications of the various purification systems.

Projects in this budget code will vary from as low as under \$10,000 to as high as several hundreds of thousands of dollars.

Project Justification:

This series of budget codes provide for expenditures associated with the costs of equipment used primarily for the removal of impurities from, or the conditioning of, natural gas delivered to or removed from underground storage fields. Some examples of the type of equipment included in this area are dehydrators, coolers, scrubbers, boilers, pumps, valves, piping, power and instrumentation

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00414.0
Category: E. Purification Equipment
Category-Sub: 4. Storage - Purification - Blanket Projects
Workpaper Group: 00414J - Storage - Purification - Blanket Projects

Forecast Methodology:

Labor - Zero-Based

The labor portion of this estimate is based on five years of recorded costs in this BC.

Non-Labor - Zero-Based

Forecast costs shown here for year 2014 are based on the Budget Categories in 2014 less specific amounts for large projects shown on other work papers. Costs shown here forecast for years 2015 and 2016 are based on five-year averages for these budget categories in years 2009-2013.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00414J**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00414.0
 Category: E. Purification Equipment
 Category-Sub: 4. Storage - Purification - Blanket Projects
 Workpaper Group: 00414J - Storage - Purification - Blanket Projects
 Workpaper Detail: 00414J.001 - Storage Purification - Blanket Projects
 In-Service Date: Not Applicable

Description:

Gas Storage - Purification

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		212	430	691
Non-Labor		1,417	4,147	5,896
NSE		0	0	0
	Total	1,629	4,577	6,587
FTE		1.9	3.9	6.3

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Category: F. Auxiliary Equipment
Workpaper: VARIOUS

Summary for Category: F. Auxiliary Equipment

	In 2013\$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2013	2014	2015	2016
Labor	0	1,074	890	667
Non-Labor	0	13,324	11,032	8,281
NSE	0	0	0	0
Total	0	14,398	11,922	8,948
FTE	0.0	10.5	8.6	6.5

00419A Aliso Canyon - Central Control Room Modernization

Labor	0	151	75	0
Non-Labor	0	1,870	935	0
NSE	0	0	0	0
Total	0	2,021	1,010	0
FTE	0.0	1.5	0.7	0.0

00419E Aliso Canyon - Main Plant Power Line Upgrades

Labor	0	75	0	0
Non-Labor	0	935	0	0
NSE	0	0	0	0
Total	0	1,010	0	0
FTE	0.0	0.7	0.0	0.0

00419F Aliso - Sesnon Gathering Plant Relief

Labor	0	83	23	75
Non-Labor	0	1,028	280	935
NSE	0	0	0	0
Total	0	1,111	303	1,010
FTE	0.0	0.8	0.2	0.7

00419M Gas Storage - Aux Equipment - Blanket Projects

Labor	0	765	792	592
Non-Labor	0	9,491	9,817	7,346
NSE	0	0	0	0
Total	0	10,256	10,609	7,938
FTE	0.0	7.5	7.7	5.8

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00419A - Aliso Canyon - Central Control Room Modernization

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00419.0
 Category: F. Auxiliary Equipment
 Category-Sub: 1. Aliso Canyon - Central Control Room Modernization
 Workpaper Group: 00419A - Aliso Canyon - Central Control Room Modernization

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	151	75	0
Non-Labor	Zero-Based	0	0	0	0	0	1,870	935	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	2,021	1,010	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.5	0.7	0.0

Business Purpose:

Outdated control room is need of update and reconfiguration. Modernization will be designed to allow for full operation meetings, updated facilities and communication with new Aliso Canyon Turbine Replacement (ACTR) equipment.

Physical Description:

This project includes modernization of control room displays, communication equipment and building renovation.

Project Justification:

When the new Aliso Canyon Turbine Replacement (ACTR) project is operational, the Station operators will be unable to remotely monitor and operate the new equipment.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00419.0
Category: F. Auxiliary Equipment
Category-Sub: 1. Aliso Canyon - Central Control Room Modernization
Workpaper Group: 00419A - Aliso Canyon - Central Control Room Modernization

Forecast Methodology:

Labor - Zero-Based

The labor portion of this estimate is based on five years of recorded cost history.

Non-Labor - Zero-Based

Costs based on received vendor quotes and previously completed work.

NSE - Zero-Based

None. These are Gas Storage assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00419A**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00419.0
 Category: F. Auxiliary Equipment
 Category-Sub: 1. Aliso Canyon - Central Control Room Modernization
 Workpaper Group: 00419A - Aliso Canyon - Central Control Room Modernization
 Workpaper Detail: 00419A.001 - Aliso Canyon - Central Control Room Modernization

In-Service Date: Not Applicable

Description:

Gas Storage - Aux Equipment.

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		151	75	0
Non-Labor		1,870	935	0
NSE		0	0	0
	Total	2,021	1,010	0
FTE		1.5	0.7	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00419E - Aliso Canyon - Main Plant Power Line Upgrades

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00419.0
 Category: F. Auxiliary Equipment
 Category-Sub: 2. Aliso Canyon - Main Plant Power Line Upgrades
 Workpaper Group: 00419E - Aliso Canyon - Main Plant Power Line Upgrades

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	75	0	0
Non-Labor	Zero-Based	0	0	0	0	0	935	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	1,010	0	0
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0

Business Purpose:

Overhead power system will be upgraded with new poles and wire to meet operating conditions during 120 mile per hour wind conditions and during red flag events. The new system will continue to allow the Main Plant, Dehys and gathering plant to be energized by Edison, onsite generators or alternate powers sources.

Physical Description:

Replacement of existing poles and installation of reinforced overhead wiring capable of withstanding higher wind loads and help mitigate variance levels. The project also entails underground installation of portions of the electrical distribution system.

Project Justification:

This project will provide Aliso Canyon Storage Field with increased electrical reliability by upgrading the system infrastructure to all the main plant, The project will eliminate wood poles, reduce fire danger and strengthen the electrical lines for high wind conditions. Dehys and gathering plants to remain electrified by Edison power during "Red Flag" events while decreasing the need for increases in AQMD variance requests for operation of on-site generators.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00419.0
Category: F. Auxiliary Equipment
Category-Sub: 2. Aliso Canyon - Main Plant Power Line Upgrades
Workpaper Group: 00419E - Aliso Canyon - Main Plant Power Line Upgrades

Forecast Methodology:

Labor - Zero-Based

Labor content is based on five years recorded costs in this BC.

Non-Labor - Zero-Based

Costs based on previously completed work of similar content and scope.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00419E**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00419.0
 Category: F. Auxiliary Equipment
 Category-Sub: 2. Aliso Canyon - Main Plant Power Line Upgrades
 Workpaper Group: 00419E - Aliso Canyon - Main Plant Power Line Upgrades
 Workpaper Detail: 00419E.001 - Aliso Canyon - Overhead Power System upgrades
 In-Service Date: Not Applicable

Description:

Gas Storage - Aux Equipment

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		75	0	0
Non-Labor		935	0	0
NSE		0	0	0
	Total	1,010	0	0
FTE		0.7	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00419F - Aliso - Sesnon Gathering Plant Relief

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00419.0
 Category: F. Auxiliary Equipment
 Category-Sub: 3. Aliso Canyon - Sesnon Gathering Plant Relief
 Workpaper Group: 00419F - Aliso - Sesnon Gathering Plant Relief

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Years									
Labor	Zero-Based	0	0	0	0	0	83	23	75
Non-Labor	Zero-Based	0	0	0	0	0	1,028	280	935
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	1,111	303	1,010
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.8	0.2	0.7

Business Purpose:

This project will eliminate low spots in the system that were identified during a field study of the Aliso Canyon pressure relief systems. Process Hazard Analysis (PHA) items of concern will be addressed during this project.

Physical Description:

This project will include the redesign of the existing pressure relief system at Sesnon Gathering plant. To address the safety items found during a study of the system, the relief vessel will be relocated, system piping will be designed to eliminate low points and relief valves will be replaced to meet existing and new process conditions.

Project Justification:

The current pressure relief system has several critical low points which could interfere with the gathering plant pressure relieving equipment during a full system blowdown. The liquid buildup could also overwhelm the liquid removing equipment causing the liquid to be blown to atmosphere.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00419.0
Category: F. Auxiliary Equipment
Category-Sub: 3. Aliso Canyon - Sesnon Gathering Plant Relief
Workpaper Group: 00419F - Aliso - Sesnon Gathering Plant Relief

Forecast Methodology:

Labor - Zero-Based

Labor is based on five years recorded experience in this BC.

Non-Labor - Zero-Based

Costs based on received vendor quotes and previously completed work.

NSE - Zero-Based

None. These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00419F**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00419.0
 Category: F. Auxiliary Equipment
 Category-Sub: 3. Aliso Canyon - Sesnon Gathering Plant Relief
 Workpaper Group: 00419F - Aliso - Sesnon Gathering Plant Relief
 Workpaper Detail: 00419F.001 - Aliso Canyon - Multiple large projects

In-Service Date: Not Applicable

Description:

Gas Storage - Aux Equipment

Forecast In 2013 \$(000)				
	Years	2014	2015	2016
Labor		83	23	75
Non-Labor		1,028	280	935
NSE		0	0	0
	Total	1,111	303	1,010
FTE		0.8	0.2	0.7

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00419M - Gas Storage - Aux Equipment - Blanket Projects

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00419.0
 Category: F. Auxiliary Equipment
 Category-Sub: 4. Bulk amount in 2016 to achieve 5-yr average.
 Workpaper Group: 00419M - Gas Storage - Aux Equipment - Blanket Projects

Summary of Results (Constant 2013 \$ in 000s):

Forecast Method		Adjusted Recorded					Adjusted Forecast		
		2009	2010	2011	2012	2013	2014	2015	2016
Labor	Zero-Based	0	0	0	0	0	765	792	592
Non-Labor	Zero-Based	0	0	0	0	0	9,491	9,817	7,346
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	10,256	10,609	7,938
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	7.5	7.7	5.8

Business Purpose:

This Budget Code includes costs of miscellaneous capital work in the storage fields – maintain, replace, relocate and upgrade the various controls and monitoring systems throughout the storage fields.

Physical Description:

Perform necessary replacements, installations, relocations and upgrades at the various storage fields to address safety, maintain or improve reliability, meet regulatory and environmental requirements and to meet the required functions of the various systems. Includes work on various types of field equipment not captured under budget categories 401, 402, or 404 such as instrumentation, controls, auxiliary equipment, generators, air compressors, odorization systems, electrical, drainage, infrastructure, transportation, safety and communications systems. This work paper shows funding for multiple smaller projects not qualifying for a separate work paper due to size/scope. Projects represented here will vary in cost from a few thousand dollars upward to several hundreds of thousands of dollars.

Project Justification:

These Budget Categories provide funding for work on various types of field equipment not captured in other Storage Budget categories such as instrumentation, measurement, control systems, electrical power supply, drainage, infrastructure, transportation, safety and communications systems.

Note: Totals may include rounding differences.

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
Witness: Phillip E. Baker
Budget Code: 00419.0
Category: F. Auxiliary Equipment
Category-Sub: 4. Bulk amount in 2016 to achieve 5-yr average.
Workpaper Group: 00419M - Gas Storage - Aux Equipment - Blanket Projects

Forecast Methodology:

Labor - Zero-Based

Labor content is based on five years of recorded history in this BC.

Non-Labor - Zero-Based

Costs were estimated using local knowledge of needed or backlogged smaller projects and recent history and experience of knowledgeable persons in the Storage fields.

NSE - Zero-Based

None, These are Gas Storage capital assets.

**Beginning of Workpaper Sub Details for
Workpaper Group 00419M**

Southern California Gas Company
2016 GRC - APP
Capital Workpapers

Area: UNDERGROUND STORAGE
 Witness: Phillip E. Baker
 Budget Code: 00419.0
 Category: F. Auxiliary Equipment
 Category-Sub: 4. Bulk amount in 2016 to achieve 5-yr average.
 Workpaper Group: 00419M - Gas Storage - Aux Equipment - Blanket Projects
 Workpaper Detail: 00419M.001 - Gas Storage - Aux Equipment - Blanket Projects
 In-Service Date: Not Applicable
 Description:

Gas Storage - Aux Equipment - Blanket Projects

Forecast In 2013 \$(000)				
	Years	<u>2014</u>	<u>2015</u>	<u>2016</u>
Labor		765	792	592
Non-Labor		9,491	9,817	7,346
NSE		0	0	0
	Total	10,256	10,609	7,938
FTE		7.5	7.7	5.8

Note: Totals may include rounding differences.