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

Application No. 17-10-008

Exhibit No.: (SCG-10-CWP-R)

REVISED CAPITAL WORKPAPERS TO PREPARED DIRECT TESTIMONY OF NEIL P. NAVIN ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

DECEMBER 2017

SoCalGas

A Sempra Energy utility

2019 General Rate Case - REVISED

INDEX OF WORKPAPERS

Exhibit SCG-10-CWP-R - UNDERGROUND STORAGE

2019 General Rate Case - REVISED

INDEX OF WORKPAPERS

Exhibit SCG-10-CWP-R - UNDERGROUND STORAGE

Overall Summary For Exhibit No. SCG-10-CWP-R

Area: UNDERGROUND STORAGE

Witness: Neil P. Navin

	In 2016 $ (000) Adjusted-Forecast		
	2017	2018	2019
A. COMPRESSORS	9,000	16,496	25,700
B. WELLS	59,585	49,125	60,559
C. PIPELINES	20,347	12,880	7,680
D. PURIFICATION	5,510	9,785	5,610
E. AUXILLARY EQUIPMENT	19,206	19,740	19,675
F. SIMP	75,285	71,370	53,382
G. COMPRESSORS - ACTR	19,602	1,250	0
Total	**208,535**	**180,646**	**172,606**

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Category: A. COMPRESSORS
Workpaper: VARIOUS

Summary for Category: A. COMPRESSORS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	0	540	990	1,442
Non-Labor	0	8,460	15,504	24,258
NSE	0	0	2	0
Total	**0**	**9,000**	**16,496**	**25,700**
FTE	0.0	5.1	9.4	13.6
00411A GOLETA - MAIN UNIT #4 OVERHAUL & ENGINE BLOCK OIL HEATER ADDITI				
Labor	0	120	20	0
Non-Labor	0	1,880	306	0
NSE	0	0	0	0
Total	**0**	**2,000**	**326**	**0**
FTE	0.0	1.1	0.2	0.0
00411B HONOR RANCH - REPLACE MAIN COMPRESSOR UNITS (STUDY)				
Labor	0	60	180	500
Non-Labor	0	940	2,820	9,500
NSE	0	0	0	0
Total	**0**	**1,000**	**3,000**	**10,000**
FTE	0.0	0.6	1.7	4.7
00411C PLAYA DEL REY - WET GAS COMPRESSOR				
Labor	0	60	60	0
Non-Labor	0	940	940	0
NSE	0	0	0	0
Total	**0**	**1,000**	**1,000**	**0**
FTE	0.0	0.6	0.6	0.0
00411E COMPRESSOR STATIONS - BLANKET PROJECTS				
Labor	0	300	730	942
Non-Labor	0	4,700	11,438	14,758
NSE	0	0	2	0
Total	**0**	**5,000**	**12,170**	**15,700**
FTE	0.0	2.8	6.9	8.9

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00411A - GOLETA - MAIN UNIT #4 OVERHAUL & ENGINE BLOCK OIL HEATER ADDITI

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00411.0
Category: A. COMPRESSORS
Category-Sub: 1. GOLETA- MAIN UNIT #4 O
Workpaper Group: 00411A - GOLETA - MAIN UNIT #4 OVERHAUL & ENGINE BLOCK OIL HEATER ADDITI

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	120	20	0
Non-Labor	Zero-Based	0	0	0	0	0	1,880	306	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**2,000**	**326**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.1	0.2	0.0

Business Purpose:

Compressor Unit #4 at the La Goleta storage field has reached it's maximum time in service between overhauls as per the expected engine run hours. This project is the overhaul of Unit #4 to restore and/or maintain it's efficiency, capacity and reliability. A new oil heater will be installed to reduce operational wear on internal components which will increase time before next overhaul is needed.

Physical Description:

Perform overhaul of engine and compressor. Typical project scope includes the removal and installation the following components: Engine: pistons, rings and rods; cylinder liners and new ss inserts; main bearing; camshaft and bearings; critical fasteners, timing and auxiliary chain; cylinder heads; intercool; bundles and jacket water header; gaskets; thermocouples and thermostats; Compressor: piston rings/packers/rider bands, cylinder liners. The addition of the new oil heater will reduce operational wear on internal components which will increase time before next overhaul is needed.

Project Justification:

The Main Unit #4 has reached the end of life service and has to be overhauled in order to avoid replacing them all together. Equipment overhauls maintain system reliability. Overhauls are performed when wear and tear prescribe their need. The alternative to not performing an overhaul or replacement is total failure of the equipment which will shut down or cripple the function of underground storage. 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. Not installing the new oil heater will increase operational wear on internal components which will reduce time before next overhaul is needed.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00411.0
Category:	A. COMPRESSORS
Category-Sub:	1. GOLETA- MAIN UNIT #4 O
Workpaper Group:	00411A - GOLETA - MAIN UNIT #4 OVERHAUL & ENGINE BLOCK OIL HEATER ADDITI

Forecast Methodology:

Labor - Zero-Based

Labor Portion of this estimate is based on five years experience in this BC. Previous overhauls of similar Main Units #2 & #3.

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 cost of component parts and quotes by qualified contractors. They are also based on recent overhauls of similar Main Units #2 & #3.

NSE - Zero-Based

None - These are Gas Storage capital assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00411A

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00411.0
Category:	A. COMPRESSORS
Category-Sub:	1. GOLETA- MAIN UNIT #4 O
Workpaper Group:	00411A - GOLETA - MAIN UNIT #4 OVERHAUL & ENGINE BLOCK OIL HEATER ADDITI
Workpaper Detail:	00411A.001 - GOLETA - MAIN UNIT #4 OVERHAUL & ENGINE BLOCK OIL HEATER ADD
In-Service Date:	06/30/2018

Description:

La Goleta - The Main Unit #4 overhaul and engine block oil heater addition.

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	120	20	0
Non-Labor	1,880	306	0
NSE	0	0	0
Total	**2,000**	**326**	**0**
FTE	1.1	0.2	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00411B - HONOR RANCH - REPLACE MAIN COMPRESSOR UNITS (STUDY)

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00411.0
Category: A. COMPRESSORS
Category-Sub: 2. HONOR RANCH-REPLACE MA
Workpaper Group: 00411B - HONOR RANCH - REPLACE MAIN COMPRESSOR UNITS (STUDY)

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	60	180	500
Non-Labor	Zero-Based	0	0	0	0	0	940	2,820	9,500
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**1,000**	**3,000**	**10,000**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.6	1.7	4.7

Business Purpose:

This early engineering study will be completed to cost associated with the replacement of obsolete main compressor equipment, and its ancillaries, with new gas compression and modernized control system to sustain the reliability and safety of the Honor Rancho facility.

Physical Description:

Engineering study to be completed for the replacement of five Delaval compressors and Enterprise reciprocating engines with 30,000 HP of new gas driven compression, construct new Central Compressor Station (CCS) building, install new compressor station controls system, replace station above-ground piping supports and support systems, install enhanced sensor vibration/impact monitoring systems for enhanced engine/compressor shut down, install Best Available Control Technology (BACT) to reduce emissions, demolish and abate existing compressor building.

Project Justification:

This project will include the engineering study for the replacement of five compressors and engines which are nearing the end of their useful life after more than four decades of service.
Parts availability is becoming extremely difficult to procure as the original manufacturer has been out of business since 1989. Remanufactured parts are difficult to reproduce. Rebuilt spare parts may be store for years before needed. Warranty is only valid for a limited amount of time after purchase.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00411.0
Category:	A. COMPRESSORS
Category-Sub:	2. HONOR RANCH-REPLACE MA
Workpaper Group:	00411B - HONOR RANCH - REPLACE MAIN COMPRESSOR UNITS (STUDY)

Forecast Methodology:

Labor - Zero-Based

Labor Portion of this estimate is based on five years experience in this BC and similarly completed compressor replacement studies.

Non-Labor - Zero-Based

Labor Portion of this estimate is based on five years experience in this BC and similarly completed compressor replacement studies.

NSE - Zero-Based

None - These are Gas Storage capital assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00411B

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00411.0
Category: A. COMPRESSORS
Category-Sub: 2. HONOR RANCH-REPLACE MA
Workpaper Group: 00411B - HONOR RANCH - REPLACE MAIN COMPRESSOR UNITS (STUDY)
Workpaper Detail: 00411B.001 - HONOR RANCH - REPLACE MAIN COMPRESSOR UNITS - STUDY

In-Service Date: 12/31/2019

Description:

Honor Ranch - Replace Main Compressor Units - Phase I - Study

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	60	180	500
Non-Labor	940	2,820	9,500
NSE	0	0	0
Total	**1,000**	**3,000**	**10,000**
FTE	0.6	1.7	4.7

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00411C - PLAYA DEL REY - WET GAS COMPRESSOR

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00411.0
Category: A. COMPRESSORS
Category-Sub: 3. PLAYA DEL REY-WET GAS
Workpaper Group: 00411C - PLAYA DEL REY - WET GAS COMPRESSOR

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	60	60	0
Non-Labor	Zero-Based	0	0	0	0	0	940	940	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**1,000**	**1,000**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.0

Business Purpose:

The project will add two compressors at the facility to minimize interruptions to the operation of the liquid handling system, eliminate shut-ins to the low pressure gas stream and prevent venting to atmosphere and improve the system to handle the flow of gas in the low pressure gas stream from high pressure sources.

Physical Description:

This project will include the installation of two electrically driven compressors skid packages, liquid handling equipment and enclosure for noise mitigation.

Project Justification:

The facility is currently operating a rental unit for compression of wet gas from the tank farm. The unit is currently being operated for testing purpose. Without the installation of the permanent units, the station could experience an increase station shut-ins due to the interruption of the system for routine and non-routine maintenance of the temporary unit.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00411.0
Category:	A. COMPRESSORS
Category-Sub:	3. PLAYA DEL REY-WET GAS
Workpaper Group:	00411C - PLAYA DEL REY - WET GAS COMPRESSOR

Forecast Methodology:

Labor - Zero-Based

Labor content is based on five years recorded costs in this BC and previously completed similar projects.

Non-Labor - Zero-Based

This cost is based on material quotes, contractor daily rates sheet and previously completed similar projects.

NSE - Zero-Based

None - These are Gas Storage capital assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00411C

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00411.0
Category: A. COMPRESSORS
Category-Sub: 3. PLAYA DEL REY-WET GAS
Workpaper Group: 00411C - PLAYA DEL REY - WET GAS COMPRESSOR
Workpaper Detail: 00411C.001 - GAS STORAGE - COMPRESSOR STATIONS - PLAYA DEL REY - WET GAS COMPRESSOR

In-Service Date: 12/31/2018

Description:

Playa Del Rey - Installation of wet gas compressor

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	60	60	0
Non-Labor	940	940	0
NSE	0	0	0
Total	**1,000**	**1,000**	**0**
FTE	0.6	0.6	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00411E - COMPRESSOR STATIONS - BLANKET PROJECTS

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00411.0
Category: A. COMPRESSORS
Category-Sub: 4. COMPRESSORS - BLANKET PROJECTS
Workpaper Group: 00411E - COMPRESSOR STATIONS - BLANKET PROJECTS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	300	730	942
Non-Labor	Zero-Based	0	0	0	0	0	4,700	11,438	14,758
NSE	Zero-Based	0	0	0	0	0	0	2	0
Total		**0**	**0**	**0**	**0**	**0**	**5,000**	**12,170**	**15,700**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	2.8	6.9	8.9

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 various storage fields to ensure safety, maintain or improve reliability, meet regulatory and environmental requirements, and to meet the required injection capacities of the main compressor units. This estimate is for replacing and/or upgrading compressor equipment that will be accomplished via smaller projects not qualifying for individual work papers. This will be worked as " Blanket" projects and will vary from tens of thousands to several hundreds of thousands of dollars. Individual jobs in the budget code will vary from under $10,000 to as high as several hundreds of thousands of dollars.

Project Justification:

Compressor station equipment must have continuing "capital maintenance". Deferring these projects may cause equipment to shut down, which can threaten gas supply continuity in Transmission, and ultimately Distribution, systems.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00411.0
Category:	A. COMPRESSORS
Category-Sub:	4. COMPRESSORS - BLANKET PROJECTS
Workpaper Group:	00411E - 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 Budget Code.

Non-Labor - Zero-Based

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

NSE - Zero-Based

None. These are Gas Storage capital assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00411E

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00411.0
Category:	A. COMPRESSORS
Category-Sub:	4. COMPRESSORS - BLANKET PROJECTS
Workpaper Group:	00411E - COMPRESSOR STATIONS - BLANKET PROJECTS
Workpaper Detail:	00411E.001 - COMPRESSOR STATIONS - BLANKET PROJECTS
In-Service Date:	Not Applicable

Description:

Compressor Stations - Blanket Projects

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	300	730	942
Non-Labor	4,700	11,438	14,758
NSE	0	2	0
Total	**5,000**	**12,170**	**15,700**
FTE	2.8	6.9	8.9

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Category: B. WELLS
Workpaper: VARIOUS

Summary for Category: B. WELLS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	0	596	498	585
Non-Labor	0	58,989	48,627	57,634
NSE	0	0	0	2,340
Total	**0**	**59,585**	**49,125**	**60,559**
FTE	0.0	4.9	4.1	6.8
00412A RAMP - C1 - WELL REPLACEMENTS				
Labor	0	40	180	490
Non-Labor	0	3,960	17,820	48,510
NSE	0	0	0	0
Total	**0**	**4,000**	**18,000**	**49,000**
FTE	0.0	0.3	1.5	6.0
00412B RAMP - C2 - WELL PLUG & ABANDON				
Labor	0	388	232	73
Non-Labor	0	38,512	22,918	7,177
NSE	0	0	0	0
Total	**0**	**38,900**	**23,150**	**7,250**
FTE	0.0	3.2	1.9	0.6
00412C RAMP - C3 - TUBING UPSIZING				
Labor	0	28	11	0
Non-Labor	0	2,652	1,039	0
NSE	0	0	0	0
Total	**0**	**2,680**	**1,050**	**0**
FTE	0.0	0.2	0.1	0.0
00412D RAMP - C4 - WELL WORKOVERS				
Labor	0	120	57	10
Non-Labor	0	11,849	5,312	959
NSE	0	0	0	0
Total	**0**	**11,969**	**5,369**	**969**
FTE	0.0	1.0	0.4	0.1
00412E RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS				
Labor	0	8	6	0
Non-Labor	0	1,028	550	0
NSE	0	0	0	0
Total	**0**	**1,036**	**556**	**0**
FTE	0.0	0.1	0.1	0.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Category: B. WELLS
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
00412G RAMP - C7- GAS STORAGE - WELLS - BLANKET PROJECTS				
Labor	0	12	12	12
Non-Labor	0	988	988	988
NSE	0	0	0	0
Total	**0**	**1,000**	**1,000**	**1,000**
FTE	0.0	0.1	0.1	0.1
00412H C8 - CUSHION GAS PURCHASE				
Labor	0	0	0	0
Non-Labor	0	0	0	0
NSE	0	0	0	2,340
Total	**0**	**0**	**0**	**2,340**
FTE	0.0	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00412A - RAMP - C1 - WELL REPLACEMENTS

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 1. RAMP - C1 - WELL REPLACEMENTS
Workpaper Group: 00412A - RAMP - C1 - WELL REPLACEMENTS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	40	180	490
Non-Labor	Zero-Based	0	0	0	0	0	3,960	17,820	48,510
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**4,000**	**18,000**	**49,000**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.3	1.5	6.0

Business Purpose:

Drill four (4) new wells during the 2017-2018 timeframe and seven (7) wells in 2019 timeframe to replace sixty-three to sixty-eight (63-68) existing storage wells and their associated deliverability lost due to well abandonments. Based on the assessment of gathered data sixty-three to sixty-eight (63-68) existing wells will be abandoned. The replacement storage wells will be drilled to replace abandoned wells that were of high operating cost injection/withdrawal, observation and/or liquid removal wells.

Physical Description:

Perform the necessary replacement of sixty-three to sixty-eight (63-68) existing 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, observation and/or liquid removal wells to be strategically located through out the Storage Fields.
2017 - One(1) possible PDR liquid removal well
2018 - Three (3) Aliso Canyon and/or La Goleta injection/withdrawal wells;
2019 - Seven (7) total wells, including liquid removal and/or observation wells at Playa del Rey, and injection/withdrawal wells at Aliso Canyon, La Goleta and/or Honor Rancho to replace the abandoned wells. The costs are based on historical well drilling costs in addition to recent vendor cost estimates.

Project Justification:

Necessary replacement of lost deliverability due to poor deliverability from a number of wells in addition to the lost withdrawal capacity from the required abandonments of existing storage wells. The storage wells that have been operated over an extended period of time will require repairs to casings and gravel packs. The repair are typically higher in cost casing repairs ($700k+) per occurrence and/or repeated re-gravel packing of the wells due to erosive sand production. The gravel packs of these wells typically cost from $1.8 million - $2.2 million each occurrence. Phasing in the newer, higher deliverability replacement wells and eliminating the higher operating cost wells over time, will reduce the company's long term operating cost.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	1. RAMP - C1 - WELL REPLACEMENTS
Workpaper Group:	00412A - RAMP - C1 - WELL REPLACEMENTS

Forecast Methodology:

Labor - Zero-Based

The replacement wells will have a higher productivity with a updated design compared to the abandoned 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 labor portion of this estimate is based on five years of recorded costs for similar work.

Non-Labor - Zero-Based

The 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 00412A

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 1. RAMP - C1 - WELL REPLACEMENTS
Workpaper Group: 00412A - RAMP - C1 - WELL REPLACEMENTS
Workpaper Detail: 00412A.001 - RAMP - Base - C1 - WELL REPLACEMENTS

In-Service Date: Not Applicable

Description:

Underground Storage - Well Replacements

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	40	180	490
Non-Labor	3,960	17,820	48,510
NSE	0	0	0
Total	**4,000**	**18,000**	**49,000**
FTE	0.3	1.5	6.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 1. RAMP - C1 - WELL REPLACEMENTS
Workpaper Group: 00412A - RAMP - C1 - WELL REPLACEMENTS
Workpaper Detail: 00412A.001 - RAMP - Base - C1 - WELL REPLACEMENTS

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Routine Well Work

Program Description: 'Addresses the abandonments, design, drilling and completion of replacement wells for the injection and withdrawal of natural gas and reservoir operations.

Risk/Mitigation:

Risk: B2

Mitigation: Abandonments, replacement materials and labor associated with each activity

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	39,000	39,000	39,000
High	43,000	43,000	43,000

Funding Source: CPUC-GRC

Forecast Method: Other

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 2432

Explanation: New well construction costs.

Beginning of Workpaper Group
00412B - RAMP - C2 - WELL PLUG & ABANDON

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 2. RAMP - C2 - WELL PLUG & ABANDON
Workpaper Group: 00412B - RAMP - C2 - WELL PLUG & ABANDON

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	388	232	73
Non-Labor	Zero-Based	0	0	0	0	0	38,512	22,918	7,177
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**38,900**	**23,150**	**7,250**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	3.2	1.9	0.6

Business Purpose:

The abandonment of existing wells in accordance with Public Resources Code section 3208 and new regulations and/or best practices.

Physical Description:

Perform the necessary plugging and abandonment of approximately fifty-seven to sixty-five (57-65) wells in 2017-2019. These existing wells are of older design, met their useful life or unproductive storage wells located in environmentally sensitive areas and located throughout out 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 in compliance with Public Resources Code 3208.
The planned abandonments are as follows:
2017 - 40 wells - Aliso Canyon: thirty-six (36), Honor Ranch: one (1) and La Goleta: three (3)
2018 - 17 wells - Aliso Canyon: three (3) and Playa del Rey: fourteen (14)
2019 - Playa del Rey: five (5)

Project Justification:

The required abandonment of the wells which are beyond their useful lives; the abandonment of storage wells located in environmentally sensitive areas in accordance with SB887. Additionally, Aliso Canyon wells may be plugged and abandoned to remain in compliance with existing and emerging regulations.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	2. RAMP - C2 - WELL PLUG & ABANDON
Workpaper Group:	00412B - RAMP - C2 - WELL PLUG & ABANDON

Forecast Methodology:

Labor - Zero-Based

There are approximately fifty-seven to sixty-five (57-65) wells within the existing storage fields that are planned for abandonment in 2017-2019. The average cost of each abandonment is $850k. 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 this estimate is based on five years of recorded costs for similar work.

Non-Labor - Zero-Based

There are approximately fifty-seven to sixty-five (57-65) wells within the existing storage fields that are planned for abandonment in 2017-2019. The average cost of each abandonment is $850k. 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 costs are based on historical well abandonment 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 00412B

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 2. RAMP - C2 - WELL PLUG & ABANDON
Workpaper Group: 00412B - RAMP - C2 - WELL PLUG & ABANDON
Workpaper Detail: 00412B.001 - RAMP - Base - C2 - WELL PLUG & ABANDON

In-Service Date: Not Applicable

Description:

Underground Storage - Well Plug and Abandon

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	228	232	73
Non-Labor	22,672	22,918	7,177
NSE	0	0	0
Total	**22,900**	**23,150**	**7,250**
FTE	1.9	1.9	0.6

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 2. RAMP - C2 - WELL PLUG & ABANDON
Workpaper Group: 00412B - RAMP - C2 - WELL PLUG & ABANDON
Workpaper Detail: 00412B.001 - RAMP - Base - C2 - WELL PLUG & ABANDON

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Routine Well Work

Program Description: 'Addresses the abandonments, design, drilling and completion of replacement wells for the injection and withdrawal of natural gas and reservoir operations.

Risk/Mitigation:

Risk: B2

Mitigation: Abandonments, replacement materials and labor associated with each activity

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	39,000	39,000	39,000
High	43,000	43,000	43,000

Funding Source: CPUC-GRC

Forecast Method: Other

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 8409

Explanation: Well Plug and Abadonment

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	2. RAMP - C2 - WELL PLUG & ABANDON
Workpaper Group:	00412B - RAMP - C2 - WELL PLUG & ABANDON
Workpaper Detail:	00412B.002 - RAMP - Base - C2 - WELL PLUG & ABANDON - ACCELERATED
In-Service Date:	Not Applicable

Description:

RAMP - C2 - WELL PLUG & ABANDON - ACCELERATED

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	160	0	0
Non-Labor	15,840	0	0
NSE	0	0	0
Total	**16,000**	**0**	**0**
FTE	1.3	0.0	0.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 2. RAMP - C2 - WELL PLUG & ABANDON
Workpaper Group: 00412B - RAMP - C2 - WELL PLUG & ABANDON
Workpaper Detail: 00412B.002 - RAMP - Base - C2 - WELL PLUG & ABANDON - ACCELERATED

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Routine Well Work

Program Description: Address the abandonment, design, drilling and completion of replacement well for injection and withdrawal

Risk/Mitigation:

Risk: B2

Mitigation: Abandonment, replacement material and labor associated with each activity

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	39,000	39,000	39,000
High	43,000	43,000	43,000

Funding Source: CPUC-GRC

Forecast Method: Other

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 8409

Explanation: Well Plug and Abandonment

Beginning of Workpaper Group
00412C - RAMP - C3 - TUBING UPSIZING

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 4. RAMP - C3 - TUBING UPSIZING
Workpaper Group: 00412C - RAMP - C3 - TUBING UPSIZING

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	28	11	0
Non-Labor	Zero-Based	0	0	0	0	0	2,652	1,039	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**2,680**	**1,050**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0

Business Purpose:

SoCalGas gas storage wells are being converted to tubing-only flow so as to eliminate a single point of failure design. Converting to tubing-only flow, however, results in a reduction in deliverability; this will be partially offset by upsizing of tubing.

Physical Description:

Upsizing of tubing strings in approximately 78 wells, where workovers are being performed, will be upgraded for tubing-only flow.
2017 - 48 wells - Aliso Canyon: twenty-three (23), Playa Del Rey: nine (9), Honor Ranch: fourteen (14), La Goleta: two (2)
2018 - 30 wells - Aliso Canyon: two (2), Playa Del Rey: five (5), Honor Ranch: twelve (12), La Goleta: eleven (11)

Project Justification:

Larger tubing sizes is required to maintain withdrawal/injection capacity. Not completing the tubing upsizing will decrease withdrawal and injection capacity during high demand.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	4. RAMP - C3 - TUBING UPSIZING
Workpaper Group:	00412C - RAMP - C3 - TUBING UPSIZING

Forecast Methodology:

Labor - Zero-Based

There are a total of (78) projected upsizes with an approximate cost of $35k per well. (cost of the larger string of tubing above the cost of the smaller sized string). The labor portion of this estimate is based on five years of recorded costs for similar work.

Non-Labor - Zero-Based

There are approximately seventy-eight (78) tubing replacement projects to be completed between 2017 and 2018.
The approximate cost for the upsizing from the existing tubing size is $35k.
The cost are based on historical tubing upsizing 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 00412C

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 4. RAMP - C3 - TUBING UPSIZING
Workpaper Group: 00412C - RAMP - C3 - TUBING UPSIZING
Workpaper Detail: 00412C.001 - RAMP - Base - C3 - TUBING UPSIZING

In-Service Date: Not Applicable

Description:

Underground Storage - Tubing upsize

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	28	11	0
Non-Labor	2,652	1,039	0
NSE	0	0	0
Total	**2,680**	**1,050**	**0**
FTE	0.2	0.1	0.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 4. RAMP - C3 - TUBING UPSIZING
Workpaper Group: 00412C - RAMP - C3 - TUBING UPSIZING
Workpaper Detail: 00412C.001 - RAMP - Base - C3 - TUBING UPSIZING

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Routine Well Work

Program Description: 'Addresses the abandonments, design, drilling and completion of replacement wells for the injection and withdrawal of natural gas and reservoir operations.

Risk/Mitigation:

Risk: B2

Mitigation: Abandonments, replacement materials and labor associated with each activity

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	39,000	39,000	39,000
High	43,000	43,000	43,000

Funding Source: CPUC-GRC

Forecast Method: Other

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: The estimated 2016 embedded cost for this item is already entered in Well Workovers workpaper

Beginning of Workpaper Group
00412D - RAMP - C4 - WELL WORKOVERS

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 5. RAMP - C4 - WELL WORKOVERS
Workpaper Group: 00412D - RAMP - C4 - WELL WORKOVERS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	120	57	10
Non-Labor	Zero-Based	0	0	0	0	0	11,849	5,312	959
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**11,969**	**5,369**	**969**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.0	0.4	0.1

Business Purpose:

Replacement or repair of downhole components in the existing well within the storage fields. The work includes replacement of tubing, packer and/or, pump, addition or replacement of subsurface safety valves, repair of casing of chemical treatment of wells for increased performance.

Physical Description:

Perform necessary well production tubing, packer and/or pump replacements in existing storage wells as well as casing repairs and chemical treatments. There are approximately 23 workovers projected for 2017-2019. The following have already been identified:
2017 - Playa del Rey (5) and Honor Ranch (5)
2018 - Playa del Rey (2)
2019 - Various

Project Justification:

Replacements and repairs are necessary on well equipment . If work is not performed, injection/withdrawal capacity will be decreased due to fluid encroachment or diminished number of wells available for withdrawal.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	5. RAMP - C4 - WELL WORKOVERS
Workpaper Group:	00412D - RAMP - C4 - WELL WORKOVERS

Forecast Methodology:

Labor - Zero-Based

There are a total of 23 workovers projected for 2017-2019 at an estimated average cost of $950k each. The labor portion of this estimate is based on five years of recorded costs for similar work.

Non-Labor - Zero-Based

There are a total of 23 workovers projected for 2017-2019 at an estimated average cost of $950k each. The well count is based on the known average well equipment failures all existing wells within the storage fields. The costs are based on historical workover 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 00412D

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 5. RAMP - C4 - WELL WORKOVERS
Workpaper Group: 00412D - RAMP - C4 - WELL WORKOVERS
Workpaper Detail: 00412D.001 - RAMP - Base - C4 - WELL WORKOVERS

In-Service Date: Not Applicable

Description:

Underground Storage - Well Workovers

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	120	57	10
Non-Labor	11,849	5,312	959
NSE	0	0	0
Total	**11,969**	**5,369**	**969**
FTE	1.0	0.4	0.1

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	5. RAMP - C4 - WELL WORKOVERS
Workpaper Group:	00412D - RAMP - C4 - WELL WORKOVERS
Workpaper Detail:	00412D.001 - RAMP - Base - C4 - WELL WORKOVERS

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Routine Well Work

Program Description: 'Addresses the abandonments, design, drilling and completion of replacement wells for the injection and withdrawal of natural gas and reservoir operations.

Risk/Mitigation:

Risk: B2

Mitigation: Abandonments, replacement materials and labor associated with each activity

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	39,000	39,000	39,000
High	43,000	43,000	43,000

Funding Source: CPUC-GRC

Forecast Method: Trend

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 12041

Explanation: Well Workovers

Beginning of Workpaper Group
00412E - RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 6. RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS
Workpaper Group: 00412E - RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	8	6	0
Non-Labor	Zero-Based	0	0	0	0	0	1,028	550	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**1,036**	**556**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0

Business Purpose:

Required replacement and upgrade wellhead valves located on various wells located throughout the storage fields. Required replacement and upgrade of wellhead seals located on storage wells throughout the storage fields. The wellhead seal usually occur where the seals have passed their useful lives and required replacement.

Physical Description:

Perform necessary wellhead valve replacements on existing storage wells. In 2017-2019, the work will be performed in conjunction with 20 planned well workovers at $80k each. Work includes services required to secure the well, replace the wellhead valves and return the well to service and perform necessary replacement and upgrade of older wellhead seals located on storage wells located throughout the storage fields.

Project Justification:

Necessary replacements to wellhead valves. Wellhead valves are a safety and environmental hazard if not replaced in a timely manner. 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 and would decrease injection/withdrawal capacity.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	6. RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS
Workpaper Group:	00412E - RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS

Forecast Methodology:

Labor - Zero-Based

For those workovers and recompletions in 2017-2019, the estimated costs for the associated wellhead valves and wellhead seals replacements is $80k each. The labor portion of this estimate is based on five years of recorded costs for similar work.

Non-Labor - Zero-Based

There are an approximate 20 workovers per year in 2017-2019 in which the associated wellhead valves and wellhead seals will be replaced at a cost of $80k each. The cost includes the material and services required to remove, and reinstall each wellhead seal replacement and return the well to service. The costs are based on historical workover 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 00412E

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 6. RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS
Workpaper Group: 00412E - RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS
Workpaper Detail: 00412E.001 - RAMP - Base - C5 - WELLHEAD REPAIRS AND REPLACMENTS

In-Service Date: Not Applicable

Description:

Underground Storage - Wellhead repairs and replacements

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	8	6	0
Non-Labor	1,028	550	0
NSE	0	0	0
Total	**1,036**	**556**	**0**
FTE	0.1	0.1	0.0

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	6. RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS
Workpaper Group:	00412E - RAMP - C5 - WELLHEAD REPAIRS AND REPLACMENTS
Workpaper Detail:	00412E.001 - RAMP - Base - C5 - WELLHEAD REPAIRS AND REPLACMENTS

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Routine Well Work

Program Description: 'Addresses the abandonments, design, drilling and completion of replacement wells for the injection and withdrawal of natural gas and reservoir operations.

Risk/Mitigation:

Risk: B2

Mitigation: Abandonments, replacement materials and labor associated with each activity

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	39,000	39,000	39,000
High	43,000	43,000	43,000

Funding Source: CPUC-GRC

Forecast Method: Other

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 1250

Explanation: Wellhead repairs and replacements

Beginning of Workpaper Group
00412G - RAMP - C7- GAS STORAGE - WELLS - BLANKET PROJECTS

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 8. RAMP - C7- WELLS - BLANKET PROJECTS
Workpaper Group: 00412G - RAMP - C7- GAS STORAGE - WELLS - BLANKET PROJECTS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	12	12	12
Non-Labor	Zero-Based	0	0	0	0	0	988	988	988
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**1,000**	**1,000**	**1,000**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1

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 ensure 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, 422. Individual project 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:

Ongoing improvements and repairs are required to maintain withdrawal and injection capacity. These projects would include well repair and equipment replacement that would impact the deliverability from the wells.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	8. RAMP - C7- WELLS - BLANKET PROJECTS
Workpaper Group:	00412G - RAMP - C7- GAS STORAGE - WELLS - BLANKET PROJECTS

Forecast Methodology:

Labor - Zero-Based

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

Non-Labor - Zero-Based

This estimate is the sum of several smaller projects shown in the Gas Storage 5-year capital plan. Such items are based on the 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 00412G

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	8. RAMP - C7- WELLS - BLANKET PROJECTS
Workpaper Group:	00412G - RAMP - C7- GAS STORAGE - WELLS - BLANKET PROJECTS
Workpaper Detail:	00412G.001 - RAMP - Base - C7- WELLS - BLANKET PROJECTS
In-Service Date:	Not Applicable

Description:

Well Blanket Projects

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	12	12	12
Non-Labor	988	988	988
NSE	0	0	0
Total	**1,000**	**1,000**	**1,000**
FTE	0.1	0.1	0.1

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 8. RAMP - C7- WELLS - BLANKET PROJECTS
Workpaper Group: 00412G - RAMP - C7- GAS STORAGE - WELLS - BLANKET PROJECTS
Workpaper Detail: 00412G.001 - RAMP - Base - C7- WELLS - BLANKET PROJECTS

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Routine Well Work

Program Description: 'Addresses the abandonments, design, drilling and completion of replacement wells for the injection and withdrawal of natural gas and reservoir operations.

Risk/Mitigation:

Risk: B2

Mitigation: Abandonments, replacement materials and labor associated with each activity

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Other

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation: The estimated 2016 embedded cost for this item is already entered in the UGS workpaper group, 412.

Beginning of Workpaper Group
00412H - C8 - CUSHION GAS PURCHASE

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 9. C8 - CUSHION GAS PURCHASE
Workpaper Group: 00412H - C8 - CUSHION GAS PURCHASE

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	0	0	0	0	0	0	0	0
NSE	Zero-Based	0	0	0	0	0	0	0	2,340
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2,340**
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 2019 are needed to support the approved expansion of Honor Ranch Storage field.

Project Justification:

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

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00412.0
Category:	B. WELLS
Category-Sub:	9. C8 - CUSHION GAS PURCHASE
Workpaper Group:	00412H - C8 - CUSHION GAS PURCHASE

Forecast Methodology:

Labor - Zero-Based

None

Non-Labor - Zero-Based

Cost is to purchase 200MCF using a BTU conversion of 1.032 giving 206.4MDTH at $2.74 to $2.91 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 00412H

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00412.0
Category: B. WELLS
Category-Sub: 9. C8 - CUSHION GAS PURCHASE
Workpaper Group: 00412H - C8 - CUSHION GAS PURCHASE
Workpaper Detail: 00412H.001 - C8 - CUSHION GAS PURCHASE

In-Service Date: Not Applicable

Description:

Underground Storage - Cushion Gas - Honor Ranch

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	0	0	0
NSE	0	0	2,340
Total	**0**	**0**	**2,340**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Category: C. PIPELINES
Workpaper: VARIOUS

Summary for Category: C. PIPELINES

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	0	1,425	902	542
Non-Labor	0	18,922	11,978	7,138
NSE	0	0	0	0
Total	**0**	**20,347**	**12,880**	**7,680**
FTE	0.0	14.5	9.2	5.6
00413A ALISO CANYON - VALVE REPLACEMENTS				
Labor	0	62	62	62
Non-Labor	0	818	818	818
NSE	0	0	0	0
Total	**0**	**880**	**880**	**880**
FTE	0.0	0.6	0.6	0.6
00413B RAMP - ALISO PIPE BRIDGE REPLACEMENT				
Labor	0	560	560	0
Non-Labor	0	7,440	7,440	0
NSE	0	0	0	0
Total	**0**	**8,000**	**8,000**	**0**
FTE	0.0	5.7	5.7	0.0
00413C PIPELINES - BLANKET PROJECTS				
Labor	0	803	280	480
Non-Labor	0	10,664	3,720	6,320
NSE	0	0	0	0
Total	**0**	**11,467**	**4,000**	**6,800**
FTE	0.0	8.2	2.9	5.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00413A - ALISO CANYON - VALVE REPLACEMENTS

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00413.0
Category: C. PIPELINES
Category-Sub: 1. ALISO CANYON - VALVE REPLACEMENTS
Workpaper Group: 00413A - ALISO CANYON - VALVE REPLACEMENTS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	62	62	62
Non-Labor	Zero-Based	0	0	0	0	0	818	818	818
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**880**	**880**	**880**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6

Business Purpose:

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

Physical Description:

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

Project Justification:

Pipeline valves (block, well site, safety, etc) in the Storage Field may be identified for replacement to improve functionality. 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.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00413.0
Category:	C. 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 in cost in this BC.

Non-Labor - Zero-Based

Cost based on pervious year's material cost.

NSE - Zero-Based

None. These are Gas Storage capital assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00413A

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00413.0
Category: C. PIPELINES
Category-Sub: 1. ALISO CANYON - VALVE REPLACEMENTS
Workpaper Group: 00413A - ALISO CANYON - VALVE REPLACEMENTS
Workpaper Detail: 00413A.001 - ALISO CANYON - VALVE REPLACEMENTS

In-Service Date: Not Applicable

Description:

Aliso Canyon - Valve Replacements

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	62	62	62
Non-Labor	818	818	818
NSE	0	0	0
Total	**880**	**880**	**880**
FTE	0.6	0.6	0.6

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00413B - RAMP - ALISO PIPE BRIDGE REPLACEMENT

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00413.0
Category: C. PIPELINES
Category-Sub: 2. RAMP - ALISO PIPE BRIDGE REPLACEMENT
Workpaper Group: 00413B - RAMP - ALISO PIPE BRIDGE REPLACEMENT

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	560	560	0
Non-Labor	Zero-Based	0	0	0	0	0	7,440	7,440	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**8,000**	**8,000**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	5.7	5.7	0.0

Business Purpose:

This project will relocate an existing pipe rack out of an area with potential landslide and soil erosion.

Physical Description:

This project will remove existing pipe from a ravine. A new pipe bridge will be installed across the ravine. New pipe will be installed in the bridge and will be connected to new and existing pipes on either end.

Project Justification:

Relocating the existing pipe rack will enhance safety by mitigating risks associated with landslides and erosion.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00413.0
Category:	C. PIPELINES
Category-Sub:	2. RAMP - ALISO PIPE BRIDGE REPLACEMENT
Workpaper Group:	00413B - RAMP - ALISO PIPE BRIDGE REPLACEMENT

Forecast Methodology:

Labor - Zero-Based

The overall project costs were estimated by project management and engineering teams by completing formal RFP and bid process with contracts department, project management and engineering teams. The labor portion of the estimate is based on five years of recorded costs in this BC.

Non-Labor - Zero-Based

The overall project costs were estimated by project management and engineering teams by completing formal RFP and bid process with contracts department, project management and engineering teams. The labor portion of the 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 00413B

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00413.0
Category: C. PIPELINES
Category-Sub: 2. RAMP - ALISO PIPE BRIDGE REPLACEMENT
Workpaper Group: 00413B - RAMP - ALISO PIPE BRIDGE REPLACEMENT
Workpaper Detail: 00413B.001 - RAMP - Base- ALISO PIPE BRIDGE REPLACEMENT

In-Service Date: 12/31/2018

Description:

RAMP - Aliso Pipe Bridge Replacement

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	560	560	0
Non-Labor	7,440	7,440	0
NSE	0	0	0
Total	**8,000**	**8,000**	**0**
FTE	5.7	5.7	0.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00413.0
Category: C. PIPELINES
Category-Sub: 2. RAMP - ALISO PIPE BRIDGE REPLACEMENT
Workpaper Group: 00413B - RAMP - ALISO PIPE BRIDGE REPLACEMENT
Workpaper Detail: 00413B.001 - RAMP - Base- ALISO PIPE BRIDGE REPLACEMENT

RAMP Item # 1

RAMP Chapter: SCG-9

Program Name: Erosion Mitigation Projects

Program Description: Promotes safety by making sure pipelines are not inhibited by land movement/loss.

Risk/Mitigation:

Risk: B3/P4

Mitigation: Combat land movement through ground stabilization projects in both Gas Transmission and Gas Storage.

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	1,400	1,400	1,400
High	1,600	1,600	1,600

Funding Source: CPUC-GRC
Forecast Method: Zero-Based
Construction Start Date: 06/01/2017
Work Type: Non-Mandated
Work Type Citation: AGS Routine Capital

Historical Embedded Cost Estimates ($000)

Embedded Costs: 1028

Explanation: Engineering and Design

Beginning of Workpaper Group
00413C - PIPELINES - BLANKET PROJECTS

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00413.0
Category: C. PIPELINES
Category-Sub: 3. PIPELINES - BLANKET PROJECTS
Workpaper Group: 00413C - PIPELINES - BLANKET PROJECTS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	803	280	480
Non-Labor	Zero-Based	0	0	0	0	0	10,664	3,720	6,320
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**11,467**	**4,000**	**6,800**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	8.2	2.9	5.0

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, pipeline cathodic protection equipment, and related instrumentation and controls for these components.

Physical Description:

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

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00413.0
Category:	C. PIPELINES
Category-Sub:	3. PIPELINES - BLANKET PROJECTS
Workpaper Group:	00413C - PIPELINES - BLANKET PROJECTS

Forecast Methodology:

Labor - Zero-Based

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

Non-Labor - Zero-Based

Cost estimates here are the sum of the several smaller items. Such projects are based on the needs of the storage fields for modifications to withdrawal, injections and liquid handling runs.

NSE - Zero-Based

None. These are Gas Storage capital assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00413C

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00413.0
Category: C. PIPELINES
Category-Sub: 3. PIPELINES - BLANKET PROJECTS
Workpaper Group: 00413C - PIPELINES - BLANKET PROJECTS
Workpaper Detail: 00413C.001 - PIPELINES - BLANKET PROJECTS

In-Service Date: Not Applicable

Description:

PIPELINES - BLANKET PROJECTS

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	803	280	480
Non-Labor	10,664	3,720	6,320
NSE	0	0	0
Total	**11,467**	**4,000**	**6,800**
FTE	8.2	2.9	5.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Category: D. PURIFICATION
Workpaper: VARIOUS

Summary for Category: D. PURIFICATION

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	0	771	1,370	785
Non-Labor	0	4,739	8,415	4,825
NSE	0	0	0	0
Total	**0**	**5,510**	**9,785**	**5,610**
FTE	0.0	8.0	13.7	7.8
00414A ALISO CANYON DEHYDRATION UPGRADES				
Labor	0	105	175	175
Non-Labor	0	645	1,075	1,075
NSE	0	0	0	0
Total	**0**	**750**	**1,250**	**1,250**
FTE	0.0	1.0	1.7	1.7
00414B GOLETA DEHYDRATION UPGRADES				
Labor	0	0	427	0
Non-Labor	0	0	2,623	0
NSE	0	0	0	0
Total	**0**	**0**	**3,050**	**0**
FTE	0.0	0.0	4.3	0.0
00414D PURIFICATION - BLANKET PROJECTS				
Labor	0	666	768	610
Non-Labor	0	4,094	4,717	3,750
NSE	0	0	0	0
Total	**0**	**4,760**	**5,485**	**4,360**
FTE	0.0	7.0	7.7	6.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00414A - ALISO CANYON DEHYDRATION UPGRADES

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00414.0
Category: D. PURIFICATION
Category-Sub: 1. ALISO CANYON DEHYDRATION UPGRADES
Workpaper Group: 00414A - ALISO CANYON DEHYDRATION UPGRADES

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	105	175	175
Non-Labor	Zero-Based	0	0	0	0	0	645	1,075	1,075
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**750**	**1,250**	**1,250**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	1.0	1.7	1.7

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.

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 have a system redundancy that enhances the ability to meet peak withdrawal deliverability while maintaining compliance with federal, state and local codes and standards for water content in pipeline-quality natural gas.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00414.0
Category:	D. PURIFICATION
Category-Sub:	1. ALISO CANYON DEHYDRATION UPGRADES
Workpaper Group:	00414A - 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 00414A

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00414.0
Category: D. PURIFICATION
Category-Sub: 1. ALISO CANYON DEHYDRATION UPGRADES
Workpaper Group: 00414A - ALISO CANYON DEHYDRATION UPGRADES
Workpaper Detail: 00414A.001 - ALISO CANYON DEHYDRATION UPGRADES - GAS FILTERS

In-Service Date: 12/31/2017

Description:

Aliso Canyon - Dehy Plant Gas Filters

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	105	0	0
Non-Labor	645	0	0
NSE	0	0	0
Total	**750**	**0**	**0**
FTE	1.0	0.0	0.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00414.0
Category: D. PURIFICATION
Category-Sub: 1. ALISO CANYON DEHYDRATION UPGRADES
Workpaper Group: 00414A - ALISO CANYON DEHYDRATION UPGRADES
Workpaper Detail: 00414A.002 - ALISO CANYON DEHYDRATION UPGRADES - GLYCOL FILTERS

In-Service Date: 12/31/2019

Description:

Aliso Canyon - Gas Filters

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	175	175
Non-Labor	0	1,075	1,075
NSE	0	0	0
Total	**0**	**1,250**	**1,250**
FTE	0.0	1.7	1.7

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00414B - GOLETA DEHYDRATION UPGRADES

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00414.0
Category: D. PURIFICATION
Category-Sub: 2. GOLETA DEHYDRATION UPGRADES
Workpaper Group: 00414B - GOLETA DEHYDRATION UPGRADES

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	0	427	0
Non-Labor	Zero-Based	0	0	0	0	0	0	2,623	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**3,050**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0

Business Purpose:

Dehy upgrades are needed to improve dehy efficiency, enhance operational safety and lower operational and maintenance cost.

Physical Description:

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

Project Justification:

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

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00414.0
Category:	D. PURIFICATION
Category-Sub:	2. GOLETA DEHYDRATION UPGRADES
Workpaper Group:	00414B - 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 00414B

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00414.0
Category: D. PURIFICATION
Category-Sub: 2. GOLETA DEHYDRATION UPGRADES
Workpaper Group: 00414B - GOLETA DEHYDRATION UPGRADES
Workpaper Detail: 00414B.001 - GOLETA DEHYDRATION UPGRADES

In-Service Date: 12/31/2018

Description:

La Goleta - Dehydration Upgrades

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	427	0
Non-Labor	0	2,623	0
NSE	0	0	0
Total	**0**	**3,050**	**0**
FTE	0.0	4.3	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00414D - PURIFICATION - BLANKET PROJECTS

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00414.0
Category: D. PURIFICATION
Category-Sub: 3. PURIFICATION - BLANKET PROJECTS
Workpaper Group: 00414D - PURIFICATION - BLANKET PROJECTS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	666	768	610
Non-Labor	Zero-Based	0	0	0	0	0	4,094	4,717	3,750
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**4,760**	**5,485**	**4,360**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	7.0	7.7	6.1

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 various storage fields to address safety, maintain or improve reliability, meet regulatory and environmental requirements, and to meet the required capacities and specifications of 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 cost 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.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00414.0
Category:	D. PURIFICATION
Category-Sub:	3. PURIFICATION - BLANKET PROJECTS
Workpaper Group:	00414D - PURIFICATION - BLANKET PROJECTS

Forecast Methodology:

Labor - Zero-Based

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

Non-Labor - Zero-Based

Forecast costs shown here are based on the Budget Categories in the average of the previous five year for this Budget Category less specific amounts for large projects shown on other work papers.

NSE - Zero-Based

None. These are Gas Storage capital assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00414D

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00414.0
Category: D. PURIFICATION
Category-Sub: 3. PURIFICATION - BLANKET PROJECTS
Workpaper Group: 00414D - PURIFICATION - BLANKET PROJECTS
Workpaper Detail: 00414D.001 - PURIFICATION - BLANKET PROJECTS

In-Service Date: Not Applicable

Description:

PURIFICATION - BLANKET PROJECTS

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	666	768	610
Non-Labor	4,094	4,717	3,750
NSE	0	0	0
Total	**4,760**	**5,485**	**4,360**
FTE	7.0	7.7	6.1

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Category: E. AUXILLARY EQUIPMENT
Workpaper: VARIOUS

Summary for Category: E. AUXILLARY EQUIPMENT

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	0	1,152	1,184	1,179
Non-Labor	0	18,054	18,556	18,496
NSE	0	0	0	0
Total	**0**	**19,206**	**19,740**	**19,675**
FTE	0.0	11.8	12.1	12.0
00419A ALISO CANYON - OVERHEAD POWER SYSTEM UPGRADES				
Labor	0	0	60	75
Non-Labor	0	0	940	1,175
NSE	0	0	0	0
Total	**0**	**0**	**1,000**	**1,250**
FTE	0.0	0.0	0.6	0.8
00419B ALISO CANYON - GO-95 ELECTRICAL SYSTEM UPGRADES				
Labor	0	207	151	150
Non-Labor	0	3,243	2,369	2,350
NSE	0	0	0	0
Total	**0**	**3,450**	**2,520**	**2,500**
FTE	0.0	2.1	1.6	1.5
00419C RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY				
Labor	0	60	60	60
Non-Labor	0	940	940	940
NSE	0	0	0	0
Total	**0**	**1,000**	**1,000**	**1,000**
FTE	0.0	0.6	0.6	0.6
00419D ALISO CANYON SESNON GATHERING PLANT RELIEF				
Labor	0	45	45	30
Non-Labor	0	705	705	470
NSE	0	0	0	0
Total	**0**	**750**	**750**	**500**
FTE	0.0	0.5	0.5	0.3
00419E HONOR RANCH - OPERATIONS CENTER MODERNIZATION				
Labor	0	12	60	108
Non-Labor	0	188	940	1,692
NSE	0	0	0	0
Total	**0**	**200**	**1,000**	**1,800**
FTE	0.0	0.1	0.6	1.1

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Category: E. AUXILLARY EQUIPMENT
Workpaper: VARIOUS

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
00419F RAMP - PLAYA DEL REY-HILLSIDE SOIL EROSION & SLOPE STABILITY				
Labor	0	24	150	60
Non-Labor	0	376	2,350	940
NSE	0	0	0	0
Total	**0**	**400**	**2,500**	**1,000**
FTE	0.0	0.3	1.5	0.6
00419G AUX EQUIPMENT - BLANKET PROJECTS				
Labor	0	804	658	696
Non-Labor	0	12,602	10,312	10,929
NSE	0	0	0	0
Total	**0**	**13,406**	**10,970**	**11,625**
FTE	0.0	8.2	6.7	7.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00419A - ALISO CANYON - OVERHEAD POWER SYSTEM UPGRADES

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 1. ALISO CANYON - OVERHEAD POWER SYSTEM UPGRADES
Workpaper Group: 00419A - ALISO CANYON - OVERHEAD POWER SYSTEM UPGRADES

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	0	60	75
Non-Labor	Zero-Based	0	0	0	0	0	0	940	1,175
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**1,000**	**1,250**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.8

Business Purpose:

Overhead power system will be upgraded with new poles and wire to meet operating conditions during high 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. Underground installation of portions of electrical distribution system. Install coordinated circuit fault protection.

Project Justification:

This project will provide Aliso Canyon Storage Field with increased electrical reliability by upgrading the system infrastructure and protection to all the main plant, Dehys and gathering plants, while reducing the potential for system damage, increased personnel safety, and a reduction in fire risk.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	1. ALISO CANYON - OVERHEAD POWER SYSTEM UPGRADES
Workpaper Group:	00419A - ALISO CANYON - OVERHEAD POWER SYSTEM 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 00419A

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 1. ALISO CANYON - OVERHEAD POWER SYSTEM UPGRADES
Workpaper Group: 00419A - ALISO CANYON - OVERHEAD POWER SYSTEM UPGRADES
Workpaper Detail: 00419A.001 - ALISO CANYON - OVERHEAD POWER SYSTEM UPGRADES

In-Service Date: Not Applicable

Description:

Aliso Canyon - Overhead Power System Upgrades

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	60	75
Non-Labor	0	940	1,175
NSE	0	0	0
Total	**0**	**1,000**	**1,250**
FTE	0.0	0.6	0.8

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00419B - ALISO CANYON - GO-95 ELECTRICAL SYSTEM UPGRADES

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 2. ALISO CANYON - GO-95 ELECTRICAL SYS UPGRADES - NR
Workpaper Group: 00419B - ALISO CANYON - GO-95 ELECTRICAL SYSTEM UPGRADES

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	207	151	150
Non-Labor	Zero-Based	0	0	0	0	0	3,243	2,369	2,350
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**3,450**	**2,520**	**2,500**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	2.1	1.6	1.5

Business Purpose:

Overhead power system will be upgraded with new poles and wire to meet operating conditions during high wind conditions and during red flag events.

Physical Description:

Replacement of existing poles and installation of reinforced overhead wiring capable of withstanding higher wind loads and help mitigate variance levels.

Project Justification:

This project will provide Aliso Canyon Storage Field with increased electrical reliability and stability by upgrading the system infrastructure to prevent system damage to equipment and personnel, and reduce fire risk.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	2. ALISO CANYON - GO-95 ELECTRICAL SYS UPGRADES - NR
Workpaper Group:	00419B - ALISO CANYON - GO-95 ELECTRICAL SYSTEM 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 00419B

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	2. ALISO CANYON - GO-95 ELECTRICAL SYS UPGRADES - NR
Workpaper Group:	00419B - ALISO CANYON - GO-95 ELECTRICAL SYSTEM UPGRADES
Workpaper Detail:	00419B.001 - ALISO CANYON - GO-95 ELECTRICAL SYSTEM UPGRADES - NR
In-Service Date:	12/31/2017

Description:

ALISO CANYON - GO-95 ELECTRICAL SYSTEM UPGRADES - NR

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	120	0	0
Non-Labor	1,880	0	0
NSE	0	0	0
Total	**2,000**	**0**	**0**
FTE	1.2	0.0	0.0

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	2. ALISO CANYON - GO-95 ELECTRICAL SYS UPGRADES - NR
Workpaper Group:	00419B - ALISO CANYON - GO-95 ELECTRICAL SYSTEM UPGRADES
Workpaper Detail:	00419B.002 - ALISO CANYON - GO-95 ELECTRICAL SYSTEM UPGRADES
In-Service Date:	Not Applicable

Description:

ALISO CANYON - GO-95 ELECTRICAL SYSTEM UPGRADES - R

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	87	151	150
Non-Labor	1,363	2,369	2,350
NSE	0	0	0
Total	**1,450**	**2,520**	**2,500**
FTE	0.9	1.6	1.5

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00419C - RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 3. RAMP-ALISO CYN-FRNANDO FEE 32 SLOPE STABILITY
Workpaper Group: 00419C - RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	60	60	60
Non-Labor	Zero-Based	0	0	0	0	0	940	940	940
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**1,000**	**1,000**	**1,000**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6

Business Purpose:

The proposed stabilization project will enhance safety by protecting high pressure piping from erosion. Perform an environmental review, provide site access, and provide a topographic survey. Perform an engineering and soil analysis, place and compact soil.

Physical Description:

Project includes Engineering Analysis of Slope Stability, soil properties, topographic survey, and environmental review.
This a multi-year project as a result of environmental work restrictions; work will be completed as permitted from April-Oct.
The work includes installation subdrains keys, fill and soil compaction, installation of drain lines, V-ditches, and permanent roadway.

Project Justification:

The proposed slope stabilization project will enhance safety by protecting high pressure piping from erosion. Increased protection of the high pressure piping will mitigate risk and help maintain the station's withdrawal and injection capabilities.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	3. RAMP-ALISO CYN-FRNANDO FEE 32 SLOPE STABILITY
Workpaper Group:	00419C - RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY

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 assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00419C

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 3. RAMP-ALISO CYN-FRNANDO FEE 32 SLOPE STABILITY
Workpaper Group: 00419C - RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY
Workpaper Detail: 00419C.001 - RAMP - Base - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY - 2017

In-Service Date: 12/31/2017

Description:

RAMP - Aliso Canyon - Fernando Fee 32 Slope Stability

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	60	0	0
Non-Labor	940	0	0
NSE	0	0	0
Total	**1,000**	**0**	**0**
FTE	0.6	0.0	0.0

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	3. RAMP-ALISO CYN-FRNANDO FEE 32 SLOPE STABILITY
Workpaper Group:	00419C - RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY
Workpaper Detail:	00419C.001 - RAMP - Base - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY - 2017

RAMP Item # 1

RAMP Chapter: SCG-9

Program Name: Erosion Mitigation Projects

Program Description: Promotes safety by making sure pipelines are not inhibited by land movement/loss.

Risk/Mitigation:

Risk: B3/P4

Mitigation: Combat land movement through ground stabilization projects in both Gas Transmission and Gas Storage.

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	1,400	1,400	1,400
High	1,600	1,600	1,600

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Construction Start Date: 01/31/2017

Work Type: Non-Mandated

Work Type Citation: AGS Routine Capital

Historical Embedded Cost Estimates ($000)

Embedded Costs: 1002

Explanation: Phase II of construction.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 3. RAMP-ALISO CYN-FRNANDO FEE 32 SLOPE STABILITY
Workpaper Group: 00419C - RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY
Workpaper Detail: 00419C.002 - RAMP - Base - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY - 2018

In-Service Date: 12/31/2018

Description:

RAMP - Aliso Canyon - Fernando Fee 32 Slope Stability - 2018

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	60	0
Non-Labor	0	940	0
NSE	0	0	0
Total	**0**	**1,000**	**0**
FTE	0.0	0.6	0.0

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	3. RAMP-ALISO CYN-FRNANDO FEE 32 SLOPE STABILITY
Workpaper Group:	00419C - RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY
Workpaper Detail:	00419C.002 - RAMP - Base - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY - 2018

RAMP Item # 1

RAMP Chapter: SCG-9

Program Name: Erosion Mitigation Projects

Program Description: Promotes safety by making sure pipelines are not inhibited by land movement/loss.

Risk/Mitigation:

Risk: B3/P4

Mitigation: Combat land movement through ground stabilization projects in both Gas transmission and Gas Storage

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	1,400	1,400	1,400
High	1,600	1,600	1,600

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Construction Start Date: 01/31/2018

Work Type: Mandated

Work Type Citation: AGS Routine Capital

Historical Embedded Cost Estimates ($000)

Embedded Costs: 1002

Explanation: Phase II of Construction

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	3. RAMP-ALISO CYN-FRNANDO FEE 32 SLOPE STABILITY
Workpaper Group:	00419C - RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY
Workpaper Detail:	00419C.003 - RAMP - Base - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY - 2019
In-Service Date:	12/31/2019

Description:

RAMP - Aliso Canyon - Fernando Fee 32 Slope Stability - 2019

Forecast In 2016 $(000)

Years	2017	2018	2019
Labor	0	0	60
Non-Labor	0	0	940
NSE	0	0	0
Total	**0**	**0**	**1,000**
FTE	0.0	0.0	0.6

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	3. RAMP-ALISO CYN-FRNANDO FEE 32 SLOPE STABILITY
Workpaper Group:	00419C - RAMP - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY
Workpaper Detail:	00419C.003 - RAMP - Base - ALISO CANYON-FERNANDO FEE 32 SLOPE STABILITY - 2019

RAMP Item # 1

RAMP Chapter: SCG-9

Program Name: Erosion Mitigation Projects

Program Description: Promotes safety by making sure pipelines are not inhibited by land movement/loss.

Risk/Mitigation:

Risk: B3/P4

Mitigation: Combat land movement through ground stabilization projects in both Gas transmission and Gas Storage

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	1,400	1,400	1,400
High	1,600	1,600	1,600

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Construction Start Date: 01/31/2019

Work Type: Mandated

Work Type Citation: AGS Routine Capital

Historical Embedded Cost Estimates ($000)

Embedded Costs: 1002

Explanation: Phase II of Construction

Beginning of Workpaper Group
00419D - ALISO CANYON SESNON GATHERING PLANT RELIEF

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 4. ALISO CANYON SESNON GATHERING PLANT RELIEF
Workpaper Group: 00419D - ALISO CANYON SESNON GATHERING PLANT RELIEF

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	45	45	30
Non-Labor	Zero-Based	0	0	0	0	0	705	705	470
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**750**	**750**	**500**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.3

Business Purpose:

This project will eliminate low spots in the system and relocate the relief vessel to enhance safety and liquid containment during a relief event at the facility.

Physical Description:

This project will include the redesign of the existing pressure relief system at Sesnon Gathering plant. To enhance safety, 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 will be redesigned to better enable the pressure relief system to reduce pressure during a system blowdown. Additionally, the design would prevent the liquids from being blown to atmosphere during a relief event.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	4. ALISO CANYON SESNON GATHERING PLANT RELIEF
Workpaper Group:	00419D - ALISO CANYON 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 assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00419D

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 4. ALISO CANYON SESNON GATHERING PLANT RELIEF
Workpaper Group: 00419D - ALISO CANYON SESNON GATHERING PLANT RELIEF
Workpaper Detail: 00419D.001 - ALISO CANYON SESNON GATHERING PLANT RELIEF

In-Service Date: 12/31/2019

Description:

Aliso Canyon - Sesnon Gathering Plant Relief

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	45	45	30
Non-Labor	705	705	470
NSE	0	0	0
Total	**750**	**750**	**500**
FTE	0.5	0.5	0.3

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00419E - HONOR RANCH - OPERATIONS CENTER MODERNIZATION

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 5. HONOR RANCH - OPERATIONS CENTER MODERNIZATION
Workpaper Group: 00419E - HONOR RANCH - OPERATIONS CENTER MODERNIZATION

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	12	60	108
Non-Labor	Zero-Based	0	0	0	0	0	188	940	1,692
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**200**	**1,000**	**1,800**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.1	0.6	1.1

Business Purpose:

Proposal to update and reconfigure control room. Modernization will be designed to allow for full operation meetings, updated facilities and communication with operating equipment.

Physical Description:

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

Project Justification:

The new control room will Station personnel to remotely monitor new and updated field equipment. The control room upgrade will expand work space to accommodate for centralized work spaces.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	5. HONOR RANCH - OPERATIONS CENTER MODERNIZATION
Workpaper Group:	00419E - HONOR RANCH - OPERATIONS CENTER 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 00419E

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 5. HONOR RANCH - OPERATIONS CENTER MODERNIZATION
Workpaper Group: 00419E - HONOR RANCH - OPERATIONS CENTER MODERNIZATION
Workpaper Detail: 00419E.001 - HONOR RANCH - OPERATIONS CENTER MODERNIZATION

In-Service Date: 12/31/2019

Description:

Honor Ranch - Operations Center Modernization

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	12	60	108
Non-Labor	188	940	1,692
NSE	0	0	0
Total	**200**	**1,000**	**1,800**
FTE	0.1	0.6	1.1

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00419F - RAMP - PLAYA DEL REY-HILLSIDE SOIL EROSION & SLOPE STABILITY

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 6. RAMP-PLAYA DEL REY-HILLSID SOIL EROSN & SLOPE STAB
Workpaper Group: 00419F - RAMP - PLAYA DEL REY-HILLSIDE SOIL EROSION & SLOPE STABILITY

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	24	150	60
Non-Labor	Zero-Based	0	0	0	0	0	376	2,350	940
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**400**	**2,500**	**1,000**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.3	1.5	0.6

Business Purpose:

The slope is eroding within close proximity to high pressure piping and adjacent neighbor's property. The stabilization project will enhance safety by protecting high pressure piping from erosion. Perform an environmental review, topographic survey, engineering and soils analysis. Provide soil erosion plan for rainy season & recommendations for stabilization of the hillside. Construct stabilization restorations.

Physical Description:

Project includes engineering analysis of slope stabilization, soil properties, and environmental review. There are 2 deliverables: (1) Interim plan for soil erosion consisting of temporary BMPS; (2) permanent plan consisting of installation of geogrid and regarding of entire hillsides.

Project Justification:

The proposed slope stabilization project will enhance safety by protecting high pressure piping from erosion. Increased protection of the high pressure piping will mitigate risk and help maintain the station's withdrawal and injection capabilities.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	6. RAMP-PLAYA DEL REY-HILLSID SOIL EROSN & SLOPE STAB
Workpaper Group:	00419F - RAMP - PLAYA DEL REY-HILLSIDE SOIL EROSION & SLOPE STABILITY

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 assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00419F

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 6. RAMP-PLAYA DEL REY-HILLSID SOIL EROSN & SLOPE STAB
Workpaper Group: 00419F - RAMP - PLAYA DEL REY-HILLSIDE SOIL EROSION & SLOPE STABILITY
Workpaper Detail: 00419F.001 - RAMP - Base - PLAYA DEL REY-HILLSIDE SOIL EROSION & SLOPE STABILITY

In-Service Date: 12/31/2019

Description:

RAMP - Playa Del Rey - Hillside Soil Erosion & Slope Stability

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	24	150	60
Non-Labor	376	2,350	940
NSE	0	0	0
Total	**400**	**2,500**	**1,000**
FTE	0.3	1.5	0.6

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	6. RAMP-PLAYA DEL REY-HILLSID SOIL EROSN & SLOPE STAB
Workpaper Group:	00419F - RAMP - PLAYA DEL REY-HILLSIDE SOIL EROSION & SLOPE STABILITY
Workpaper Detail:	00419F.001 - RAMP - Base - PLAYA DEL REY-HILLSIDE SOIL EROSION & SLOPE STABILITY

RAMP Item # 1

RAMP Chapter: SCG-9

Program Name: Erosion Mitigation Projects

Program Description: Promotes safety by making sure pipelines are not inhibited by land movement/loss.

Risk/Mitigation:

Risk: B3/P4

Mitigation: Combat land movement through ground stabilization projects in both Gas Transmission and Gas Storage.

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	1,400	1,400	1,400
High	1,600	1,600	1,600

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Construction Start Date: 06/01/2017

Work Type: Non-Mandated

Work Type Citation: AGS Routine Capital

Historical Embedded Cost Estimates ($000)

Embedded Costs: 75

Explanation: Engineering and Design

Beginning of Workpaper Group
00419G - AUX EQUIPMENT - BLANKET PROJECTS

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 7. AUX EQUIPMENT - BLANKET PROJECTS
Workpaper Group: 00419G - AUX EQUIPMENT - BLANKET PROJECTS

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	804	658	696
Non-Labor	Zero-Based	0	0	0	0	0	12,602	10,312	10,929
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**13,406**	**10,970**	**11,625**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	8.2	6.7	7.1

Business Purpose:

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

Physical Description:

Perform necessary replacements, installations, relocations, and upgrades at the various storage fields to ensure 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 fields equipment not captured under budget categories 411, 412, or 414 such as instrumentation, controls, auxiliary equipment, generators, air compressors, odorization systems, electrical, drainage, infrastructure, transportation, safety, and communications systems.

Forecasted amounts do not include several line-item projects shown on other work papers in this Budget Code.

Project Justification:

This Budget Category provides funding for work on various types of field equipment not captured in other Storage Budget Categories, such as instrumentation, controls, auxiliary equipment, generators, air compressors, odorization systems, electrical, drainage, infrastructure, transportation, safety, and communications systems. If these auxiliary systems fail to operate at required design levels, the company's ability to safely and efficiently deliver gas to our customers may be compromised.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00419.0
Category:	E. AUXILLARY EQUIPMENT
Category-Sub:	7. AUX EQUIPMENT - BLANKET PROJECTS
Workpaper Group:	00419G - AUX EQUIPMENT - BLANKET PROJECTS

Forecast Methodology:

Labor - Zero-Based

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

Non-Labor - Zero-Based

Forecast costs shown here for are based on the average of the previous five year for this Budget Category less specific amounts for large projects shown on other work papers.

NSE - Zero-Based

None. These are Gas Storage assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00419G

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00419.0
Category: E. AUXILLARY EQUIPMENT
Category-Sub: 7. AUX EQUIPMENT - BLANKET PROJECTS
Workpaper Group: 00419G - AUX EQUIPMENT - BLANKET PROJECTS
Workpaper Detail: 00419G.001 - AUX EQUIPMENT - BLANKET PROJECTS

In-Service Date: Not Applicable

Description:

AUX EQUIPMENT - BLANKET PROJECTS

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	804	658	696
Non-Labor	12,602	10,312	10,929
NSE	0	0	0
Total	**13,406**	**10,970**	**11,625**
FTE	8.2	6.7	7.1

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Category: F. SIMP
Workpaper: VARIOUS

Summary for Category: F. SIMP

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	0	1,139	1,292	1,134
Non-Labor	0	74,146	70,078	52,248
NSE	0	0	0	0
Total	**0**	**75,285**	**71,370**	**53,382**
FTE	0.0	9.7	11.3	9.7
00441B Plug and Abandon				
Labor	0	47	24	0
Non-Labor	0	3,753	1,876	0
NSE	0	0	0	0
Total	**0**	**3,800**	**1,900**	**0**
FTE	0.0	0.4	0.2	0.0
00441C Inspection/Return to Operation				
Labor	0	1,092	1,268	1,092
Non-Labor	0	67,813	66,852	45,140
NSE	0	0	0	0
Total	**0**	**68,905**	**68,120**	**46,232**
FTE	0.0	9.3	11.1	9.3
00441D Data Management				
Labor	0	0	0	0
Non-Labor	0	2,580	1,350	650
NSE	0	0	0	0
Total	**0**	**2,580**	**1,350**	**650**
FTE	0.0	0.0	0.0	0.0
00441E Emerging Monitoring Integrity and Safety Technology Pilot				
Labor	0	0	0	42
Non-Labor	0	0	0	4,958
NSE	0	0	0	0
Total	**0**	**0**	**0**	**5,000**
FTE	0.0	0.0	0.0	0.4
00441G Cathodic Protection				
Labor	0	0	0	0
Non-Labor	0	0	0	1,500
NSE	0	0	0	0
Total	**0**	**0**	**0**	**1,500**
FTE	0.0	0.0	0.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00441B - Plug and Abandon

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 1. RSIMP - Plug and Abandonment of Wells
Workpaper Group: 00441B - Plug and Abandon

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	47	24	0
Non-Labor	Zero-Based	0	0	0	0	0	3,753	1,876	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**3,800**	**1,900**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.0

Business Purpose:

California Public Resources Code section 3208 requires wells to be plug and abandoned to the Division's (DOGGR) satisfaction. Wells that have undergone logging inspection and are not viable for remediation have been identified as SIMP abandonments.

Physical Description:

Perform the plugging and abandonment of approximately six (6) wells in 2017-2018. These existing wells were identified for abandonment by SIMP inspection and review and are 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 in compliance with Public Resources Code 3208.

Project Justification:

SIMP logging inspection of these wells show they are not viable candidates to be returned to service, primarily due to forecasted excessive repair cost - on order of a replacement well.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00441.0
Category:	F. SIMP
Category-Sub:	1. RSIMP - Plug and Abandonment of Wells
Workpaper Group:	00441B - Plug and Abandon

Forecast Methodology:

Labor - Zero-Based

Labor is calculated from employee salary and expected FTE allotment based on SIMP capital work.

Non-Labor - Zero-Based

There are approximately six (6) wells total planned for abandonment in 2017-2018 among the existing storage fields at an average cost of cost $950k each. The individual well abandonment costs will vary depending on various factors including the condition of the well at the time of the abandonment, surface location of the well, and 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 00441B

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 1. RSIMP - Plug and Abandonment of Wells
Workpaper Group: 00441B - Plug and Abandon
Workpaper Detail: 00441B.001 - RAMP Incremental - RSIMP - Plug and Abandonment of Wells

In-Service Date: Not Applicable

Description:

RSIMP Plug and Abandonment

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	47	24	0
Non-Labor	3,753	1,876	0
NSE	0	0	0
Total	**3,800**	**1,900**	**0**
FTE	0.4	0.2	0.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 1. RSIMP - Plug and Abandonment of Wells
Workpaper Group: 00441B - Plug and Abandon
Workpaper Detail: 00441B.001 - RAMP Incremental - RSIMP - Plug and Abandonment of Wells

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Initial SIMP to inspect all wells will be accelerated from 6 years to 4 years.

Program Description: The SIMP is intended to proactively identify, diagnose, and mitigate potential safety an/or integrity problems associated with gas storage wells. This work will include inspection, data collection, analysis, management and reporting. In addition the replacement or repair work may include: wellhead valve replacements, well tubing replacements, wellhead leak repairs, and well inner-string replacements.

Risk/Mitigation:

Risk: P1

Mitigation: Complete SIMP in 4 years instead of 6

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
00441C - Inspection/Return to Operation

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 2. RSIMP - Inspection/Return to Operation
Workpaper Group: 00441C - Inspection/Return to Operation

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	1,092	1,268	1,092
Non-Labor	Zero-Based	0	0	0	0	0	67,813	66,852	45,140
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**68,905**	**68,120**	**46,232**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	9.3	11.1	9.3

Business Purpose:

On May 19th, 2017, the California Division of Oil Gas and Geothermal Resources (DOGGR) issued updated text of proposed regulations for Requirements for California Underground Gas Storage Projects. Section 1726.6. Mechanical Integrity Testing proposes the following inspection intervals: (a) (2) A casing wall thickness inspection, employing such methods as magnetic flux and ultrasonic technologies, shall be performed at once least[sic] every 24 months. (a)(3) A pressure test of the production casing shall be conducted at least once every 24 months. Capital workovers consist of preparing gas storage wells for inspection logging and any subsequent mitigation work identified by the inspection logging.

Physical Description:

There are approximately ninety-two (92) wells amongst the SoCalGas storage fields that will undergo first-round SIMP workover in 2017-2019. Approximately one hundred and sixteen (116) wells will undergo second-round inspection in 2018-2020, assuming a 24-month inspection interval. Approximately one hundred and nine (109) wells will undergo third-round inspection in 2020-2021, assuming the 24-month inspection interval continues. This includes using a workover rig to evaluate downhole casing and tubing conditions. Surface equipment such as valves, wellheads, and well laterals are also evaluated using enhanced integrity management methods. The wells will undergo a baseline assessment consistent with recent regulatory requirements of downhole casing and tubing conditions. Once an issue is identified, repair work is initiated to enhance safety and return the well to operation; or the well is safely isolated from the storage zone in preparation for abandonment.

Project Justification:

Enhance safety, validate well integrity, and reduce risk profile to SoCalGas' storage facilities; consistent with SoCalGas goals for risk reduction and recent regulations, including DOGGR Requirements for California Underground Gas Storage Projects and Senate Bill 887, mandating comprehensive well assessments.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00441.0
Category:	F. SIMP
Category-Sub:	2. RSIMP - Inspection/Return to Operation
Workpaper Group:	00441C - Inspection/Return to Operation

Forecast Methodology:

Labor - Zero-Based

Labor is calculated from employee salary and expected FTE allotment based on SIMP capital work.

Non-Labor - Zero-Based

First round workovers conducted in 2017-2019 among the existing storage fields are forecasted at $1295k each on average. This assumes 25% of the wells require inner string installation at $1750k per workover; and 75% of the wells require less mitigation, averaging $1100k per workover. Second and third round workovers are forecasted at $500K each on average. The individual well workover costs will vary depending on the condition of the well at the time of the inspection and repair or isolation, surface location of the well, and depth of the well.

NSE - Zero-Based

None. These are Gas Storage Capital Assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00441C

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00441.0
Category:	F. SIMP
Category-Sub:	2. RSIMP - Inspection/Return to Operation
Workpaper Group:	00441C - Inspection/Return to Operation
Workpaper Detail:	00441C.001 - RAMP Incremental - RSIMP - Inspection/Return to Operation
In-Service Date:	Not Applicable

Description:

RSIMP - Inspection/Return to Operation

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1,092	1,268	1,092
Non-Labor	67,813	66,852	45,140
NSE	0	0	0
Total	**68,905**	**68,120**	**46,232**
FTE	9.3	11.1	9.3

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 2. RSIMP - Inspection/Return to Operation
Workpaper Group: 00441C - Inspection/Return to Operation
Workpaper Detail: 00441C.001 - RAMP Incremental - RSIMP - Inspection/Return to Operation

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Initial SIMP to inspectize all wells will be accelerated from 6 years to 4 years.

Program Description: The SIMP is intended to proactively identify, diagnose, and mitigate potential safety an/or integrity problems associated with gas storage wells. This work will include inspection, data collection, analysis, management and reporting. In addition the replacement or repair work may include: wellhead valve replacements, well tubing replacements, wellhead leak repairs, and well inner-string replacements.

Risk/Mitigation:

Risk: P1

Mitigation: Complete SIMP in 4 years instead of 6

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	57,600	52,200	49,500
High	83,200	75,400	71,500

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 45000

Explanation:

Beginning of Workpaper Group
00441D - Data Management

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 3. RSIMP - Well Integrity Management Solution
Workpaper Group: 00441D - Data Management

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	0	0	0	0	0	2,580	1,350	650
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**2,580**	**1,350**	**650**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

These activities are associated with maintaining data related to storage assets and operations, in compliance with proposed DOGGR Requirements for California Underground Gas Storage Projects. Both the pace and volume of SIMP activity generates a robust suite of data for each gas storage well and requires enhancement in data management. SIMP data management has upfront implementation costs in 2016, 2017, and shows more predictable trends beginning in TY2019.

Physical Description:

The capital Data Managment component of SIMP will update, consolidate, and integrate key Underground Storage Operation Data Systems into an enterprise wide solution to improve: Data collection, Accessibility, Engineering Analysis and Risk Assessment.

Project Justification:

The Data Management system will create a robust system capable of future growth to absorb industry changes and new regulations which are imposed. The development and implementation of a Well Integrity Management Solution (WIMS) will support effective management of wells.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00441.0
Category:	F. SIMP
Category-Sub:	3. RSIMP - Well Integrity Management Solution
Workpaper Group:	00441D - Data Management

Forecast Methodology:

Labor - Zero-Based

None.

Non-Labor - Zero-Based

Forecasted expenses will vary amongst the ranges below. Costs are expected to decrease in 2019 to the lower end after initial implementation. The following items represent the majority of forecasted capital non-Labor costs for compliance with DOGGR data management.

Wellview Peloton license fees and services: $180K to $50K

Well Integrity Management Solution license fees and implementation: $1700K to $200K

Document Management System design, configuration, and implementation : $700K to $400K

NSE - Zero-Based

None.

Beginning of Workpaper Sub Details for
Workpaper Group 00441D

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 3. RSIMP - Well Integrity Management Solution
Workpaper Group: 00441D - Data Management
Workpaper Detail: 00441D.001 - RAMP Incremental - RSIMP - Data Management

In-Service Date: Not Applicable

Description:

RSIMP - Data Management

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	0
Non-Labor	2,580	1,350	650
NSE	0	0	0
Total	**2,580**	**1,350**	**650**
FTE	0.0	0.0	0.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 3. RSIMP - Well Integrity Management Solution
Workpaper Group: 00441D - Data Management
Workpaper Detail: 00441D.001 - RAMP Incremental - RSIMP - Data Management

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Initial SIMP to inspect all wells will be accelerated from 6 years to 4 years.

Program Description: The SIMP is intended to proactively identify, diagnose, and mitigate potential safety an/or integrity problems associated with gas storage wells. This work will include inspection, data collection, analysis, management and reporting. In addition the replacement or repair work may include: wellhead valve replacements, well tubing replacements, wellhead leak repairs, and well inner-string replacements.

Risk/Mitigation:

Risk: P1

Mitigation: Complete SIMP in 4 years instead of 6

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
00441E - Emerging Monitoring Integrity and Safety Technology Pilot

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 4. RSIMP-Emerging Monitoring Integrity & Safety Tech
Workpaper Group: 00441E - Emerging Monitoring Integrity and Safety Technology Pilot

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	0	0	42
Non-Labor	Zero-Based	0	0	0	0	0	0	0	4,958
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5,000**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4

Business Purpose:

Based on emerging national, state, and local regulations, SoCalGas expects to employ 3 projects to monitor status of facilities, such as unmanned aerial vehicles (UAVs) and wellbore monitoring.
Storage Risk Management department is developing a pilot to evaluate implementation of 3 UAVs into the storage fields. UAVs mounted with video cameras or optical imaging instrumentation can more efficiently and more safely inspect and survey the storage fields. UAVs can cover larger areas faster than human crews and can reach areas with rougher terrain. With regard to wellbore monitoring, fiber optic technology in the wellbore is also being evaluated. This monitoring would focus on temperature reading and acoustic reading throughout the wellbore, like a noise and temperature log, but installed in the well instead of deployed at scheduled inspection intervals such as annually or semi-annually.

Physical Description:

Two projects being evaluated for the pilot are use of UAV monitoring and fiber optic monitoring. UAVs can provide efficient, safe and cost effective solutions for surveying and analyzing difficult to reach locations. In gas storage, this could mean covering large areas for leak surveys or inspecting infrastructure above chest-level. Fiber optic well monitoring may involve technologies deployed in the well tubing such as Fiber Optic Distributed Temperature Sensors (DTS) and Fiber Optic Distributed Acoustic Sensors (DAS).

Project Justification:

Emerging compliance requirements for DOGGR, PHMSA, and other federal, state, and local agencies.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00441.0
Category:	F. SIMP
Category-Sub:	4. RSIMP-Emerging Monitoring Integrity & Safety Tech
Workpaper Group:	00441E - Emerging Monitoring Integrity and Safety Technology Pilot

Forecast Methodology:

Labor - Zero-Based

Labor is calculated from employee salary and expected FTE allotment based on SIMP/Risk Management capital work. $20K is forecasted to cover the UAV labor component of SIMP pilot activities. $22K is forecasted to cover labor for fiber optic and other probable activities.

Non-Labor - Zero-Based

The overall non-Labor component of SIMP Pilot capital workpaper is forecasted at approximately $2M for UAV and approximately $3M for fiber optic and other projects. Forecasted UAV costs and annual maintenance will be based on UAV selection and attached camera selection. Annual maintenance costs are expected to decrease as the technology matures. The forecast considers 3 UAVs with pilot set up and preparation ($43K/pilot/year); FAA pilot salary ($330k/pilot/year); drone expense ($330K/drone/year); and vehicle expense ($65K/vehicle/year). Fiber Optic Well Integrity Monitoring (DAS and DAT) equipment selection also affects ultimate forecast. Fiber Optic Well Integrity Monitoring (DAS and DAT) equipment and installation are quoted at $500K per well, with contractor data review and maintenance at $14K per month.

NSE - Zero-Based

None.

Beginning of Workpaper Sub Details for
Workpaper Group 00441E

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00441.0
Category:	F. SIMP
Category-Sub:	4. RSIMP-Emerging Monitoring Integrity & Safety Tech
Workpaper Group:	00441E - Emerging Monitoring Integrity and Safety Technology Pilot
Workpaper Detail:	00441E.001 - RAMP Incremental - RSIMP - Emerging Monitoring Integrity and Safety Technology Pilot
In-Service Date:	Not Applicable

Description:

RSIMP - Emerging Monitoring Integrity and Safety Technology Pilot

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	0	42
Non-Labor	0	0	4,958
NSE	0	0	0
Total	**0**	**0**	**5,000**
FTE	0.0	0.0	0.4

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00441.0
Category:	F. SIMP
Category-Sub:	4. RSIMP-Emerging Monitoring Integrity & Safety Tech
Workpaper Group:	00441E - Emerging Monitoring Integrity and Safety Technology Pilot
Workpaper Detail:	00441E.001 - RAMP Incremental - RSIMP - Emerging Monitoring Integrity and Safety Technology Pilot

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: Emerging Monitoring Integrity and Safety Technology Pilot

Program Description: Emerging Monitoring Integrity and Safety Technology Pilot

Risk/Mitigation:

Risk: P2

Mitigation: Emerging Monitoring Integrity and Safety Technology Pilot

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Non-Mandated

Work Type Citation: Pilot

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Beginning of Workpaper Group
00441G - Cathodic Protection

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 5. RSIMP - Cathodic Protection
Workpaper Group: 00441G - Cathodic Protection

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	0	0	0
Non-Labor	Zero-Based	0	0	0	0	0	0	0	1,500
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1,500**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Business Purpose:

Corrosion monitoring and evaluation plans for gas storage wells are required by regulations and regulatory agencies including: Senate Bill 887 approved September 26th, 2016 and DOGGR regulations on Underground Injection Control. One potential means to manage external corrosion is through the use of cathodic protection. SoCalGas is proposing a pilot effort to further evaluate the effectiveness of cathodic protection for expanded use at the storage facilities. If found effective, cathodic protection will be applied to additional wells.

Physical Description:

Evaluate a sample of wells at Aliso Canyon to see if Cathodic Protection is effective in controlling corrosion on external surfaces of the well casings. Methodologies may include comparison of a downhole tool that measures the effectiveness of CP on well casings and E – log – I. The E – log – I method may be selected for the remaining Aliso Canyon well casings, should inference of results on the sample set show the compared methodologies are effective. Additional testing may also be conducted for the effectiveness at all the fields.

Project Justification:

Corrosion monitoring and evaluation is described in various emergency regulations and recent and proposed regulations including SB887, DOGGR Underground Injection Control and CFR §192.12. SoCalGas is proposing this pilot effort to determine the effectiveness of cathodic protection to manage external corrosion.

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00441.0
Category:	F. SIMP
Category-Sub:	5. RSIMP - Cathodic Protection
Workpaper Group:	00441G - Cathodic Protection

Forecast Methodology:

Labor - Zero-Based

None.

Non-Labor - Zero-Based

In order to conduct any testing, Impressed Current Cathodic Protection (ICCP) stations will need to be installed. This number and design of ICCP will be determined once the project is approved. Some isolated, stand-alone wells may require a shallow ground bed ICCP. Other sites where multiple well casings are close in proximity, a single ICCP installation deep well ground-bed may be used. This forecast anticipates seven (7) shallow wells at $35k each and two (2) deep wells at $100k each. Some of the deep well assets may be used to provide cathodic protection to other well casings beyond the scope of the sampled wells.

NSE - Zero-Based

None. These are Gas Storage capital assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00441G

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 5. RSIMP - Cathodic Protection
Workpaper Group: 00441G - Cathodic Protection
Workpaper Detail: 00441G.001 - RAMP Incremental - RSIMP - Cathodic Protection

In-Service Date: Not Applicable

Description:

RSIMP - Cathodic Protection Evaluations/Installation

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

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00441.0
Category: F. SIMP
Category-Sub: 5. RSIMP - Cathodic Protection
Workpaper Group: 00441G - Cathodic Protection
Workpaper Detail: 00441G.001 - RAMP Incremental - RSIMP - Cathodic Protection

RAMP Item # 1

RAMP Chapter: SCG-11

Program Name: CP EvaluationsInstallation

Program Description: The new PHMSA and DOGGR regulations have new capital and O&M Requirements

Risk/Mitigation:

Risk: P2

Mitigation: New DOGGR and PHMSA Storage Regulations

Forecast CPUC Cost Estimates ($000)

	2017	2018	2019
Low	0	0	0
High	0	0	0

Funding Source: CPUC-GRC

Forecast Method: Zero-Based

Work Type: Mandated

Work Type Citation: Regulatory

Historical Embedded Cost Estimates ($000)

Embedded Costs: 0

Explanation:

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Category: G. COMPRESSORS - ACTR
Workpaper: 00411D

Summary for Category: G. COMPRESSORS - ACTR

	In 2016$ (000)			
	Adjusted-Recorded	Adjusted-Forecast		
	2016	2017	2018	2019
Labor	0	1,123	488	0
Non-Labor	0	18,479	762	0
NSE	0	0	0	0
Total	**0**	**19,602**	**1,250**	**0**
FTE	0.0	15.0	6.0	0.0

00411D ALISO CANYON - TURBINE REPLACEMENT PROJECT (ACTR)

Labor	0	1,123	488	0
Non-Labor	0	18,479	762	0
NSE	0	0	0	0
Total	**0**	**19,602**	**1,250**	**0**
FTE	0.0	15.0	6.0	0.0

Note: Totals may include rounding differences.

Beginning of Workpaper Group
00411D - ALISO CANYON - TURBINE REPLACEMENT PROJECT (ACTR)

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00411.0
Category: G. COMPRESSORS - ACTR
Category-Sub: 1. ALISO CANYON TURBINE REPLACEMENT
Workpaper Group: 00411D - ALISO CANYON - TURBINE REPLACEMENT PROJECT (ACTR)

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

Forecast Method		Adjusted Recorded					Adjusted Forecast		
Years		2012	2013	2014	2015	2016	2017	2018	2019
Labor	Zero-Based	0	0	0	0	0	1,123	488	0
Non-Labor	Zero-Based	0	0	0	0	0	18,479	762	0
NSE	Zero-Based	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**19,602**	**1,250**	**0**
FTE	Zero-Based	0.0	0.0	0.0	0.0	0.0	15.0	6.0	0.0

Business Purpose:

- Reduce the potential for interruptions in the ability to store gas in the Storage Field, by replacing the obsolete turbine driven compressor station.
- Replace the turbine driven compressors and expand the overall injection capacity at the field by approximately 145 million cubic feet per day (MMcfd) in a timely manner.
- Convert the compression from the Storage Field from natural gas to electric.
- Design and construct a new electric compressor station and all necessary related infrastructures to increase the injection capacity at the Storage Field by approximately 145 MMcfd.
- Provide improved vehicle access and security to the Storage Field by constructing a new guard house; relocate and replace existing office trailers in close proximity to the current turbine driven compressor station and Storage Field facilities; preserve other on-site facilities and minimize changes to Storage Field facility where feasible and practical.
- Ensure successful conversion to electric compression prior to decommissioning the existing turbine driven compressors to minimize the potential for gas supply service interruptions after construction of the Proposed Project.
- Utilize recent engineering and technological advances.

Physical Description:

Construct the on-site Central Compressor Station, CCS, and install new equipment including three mechanical drive compressor trains, compressors, piping, coolers, and other additional equipment required. Relocate on-site office trailer facilities and on-site guard house; the existing trailers will be replaced by new office building within proximity to the CCS. The guard house will be relocated approximately 500 feet north of the existing facility to relieve traffic congestion at the facility entrance. Construct a new on-site four circuit, 12 kV PPL that will provide dedicated electric services to the CCS. The PPL will be interconnected from the SCE Natural Substation to the CCS. The PPL will be owned by SoCalGas and designed to San Diego Gas and Electric (SDG&E) standards. Construct the on-site SCE Natural Substation including foundation and equipment pads, electrical equipment, installation of security perimeter all/chain link fence, access road, and capacitor bank (additional elements may be included in the SCE Natural Substation construction). The SCE Natural Substation will be 56 MVA, 66/12 kV with a pre-fabricated mechanical electrical and engineering room (MEER). This project component will be constructed by SCE. Construct both on-site and off-site electric modifications to two existing SCE 66 kV subtransmission lines in order to serve the CCS's load. The two existing sub-transmission lines will be re-conductored from the Newhall Substation to one pole past the Chatsworth tap point; a third line will be installed at the Chatsworth tap point, within existing ROWs and easements, to the SCE Natural Substation. Modifications will also include replacement of existing towers and H-frame structures with new tubular steel poles (TSP), and installation of telecommunication lines on the poles. This project component will be constructed and owned by SCE. Conduct off-site substation modifications at three existing SCE substations (Newhall, Chatsworth, and San Fernando Sub

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00411.0
Category:	G. COMPRESSORS - ACTR
Category-Sub:	1. ALISO CANYON TURBINE REPLACEMENT
Workpaper Group:	00411D - ALISO CANYON - TURBINE REPLACEMENT PROJECT (ACTR)

Project Justification:

Meet the terms of the Settlement Agreement between SoCalGas and parties to Phase I of the 2009 BCAP (D.08-12-020).

Note: Totals may include rounding differences.

Area:	UNDERGROUND STORAGE
Witness:	Neil P. Navin
Budget Code:	00411.0
Category:	G. COMPRESSORS - ACTR
Category-Sub:	1. ALISO CANYON TURBINE REPLACEMENT
Workpaper Group:	00411D - ALISO CANYON - TURBINE REPLACEMENT PROJECT (ACTR)

Forecast Methodology:

Labor - Zero-Based

The forecasting methodology is defined by Commission Decision D.13-11-023, whereby the Commission approved the project and stated that the costs in excess of the $200.9millions cost cap must be sought in the subsequent General Rate Case.

Non-Labor - Zero-Based

The forecasting methodology is defined by Commission Decision D.13-11-023, whereby the Commission approved the project and stated that the costs in excess of the $200.9millions cost cap must be sought in the subsequent General Rate Case.

NSE - Zero-Based

None - These are Gas Storage capital assets.

Beginning of Workpaper Sub Details for
Workpaper Group 00411D

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00411.0
Category: G. COMPRESSORS - ACTR
Category-Sub: 1. ALISO CANYON TURBINE REPLACEMENT
Workpaper Group: 00411D - ALISO CANYON - TURBINE REPLACEMENT PROJECT (ACTR)
Workpaper Detail: 00411D.001 - ALISO CANYON TURBINE REPLACEMENT PROJECT (ACTR)

In-Service Date: 11/30/2017

Description:

Aliso Canyon Turbine Replacement Project (ACTR)

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	1,123	0	0
Non-Labor	18,479	0	0
NSE	0	0	0
Total	**19,602**	**0**	**0**
FTE	15.0	0.0	0.0

Note: Totals may include rounding differences.

Area: UNDERGROUND STORAGE
Witness: Neil P. Navin
Budget Code: 00411.0
Category: G. COMPRESSORS - ACTR
Category-Sub: 1. ALISO CANYON TURBINE REPLACEMENT
Workpaper Group: 00411D - ALISO CANYON - TURBINE REPLACEMENT PROJECT (ACTR)
Workpaper Detail: 00411D.002 - ALISO CANYON TURBINE REPLACEMENT (ACTR) - CLOSE OUT

In-Service Date: 07/31/2018

Description:

ALISO CANYON TURBINE REPLACEMENT (ACTR) - CLOSE OUT

Forecast In 2016 $(000)			
Years	**2017**	**2018**	**2019**
Labor	0	488	0
Non-Labor	0	762	0
NSE	0	0	0
Total	**0**	**1,250**	**0**
FTE	0.0	6.0	0.0

Note: Totals may include rounding differences.