Company: Southern California Gas Company (U 904 G)
Proceeding: 2019 General Rate Case
Application: A.17-10-008
Exhibit: SCG-08-R

**REVISED**

**SOCALGAS**

# DIRECT TESTIMONY OF MICHAEL A. BERMEL

**(GAS MAJOR PROJECTS)**

**December 2017**

**BEFORE THE PUBLIC UTILITIES COMMISSION**
**OF THE STATE OF CALIFORNIA**

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## SUMMARY

Southern California Gas Company (SoCalGas or Company) requests the Commission to adopt its Test Year (TY) 2019 forecast of $3,971,000 for Major Projects and Construction (MPC) Operations and Maintenance (O&M) expenses, which is composed entirely of non-shared service activities. SoCalGas further requests the Commission to adopt its capital expenditures in 2017, 2018, and 2019 of $1,200,000, $8,969,000, and $37,714,000, respectively.

SoCalGas' ability to meet its obligation to provide natural gas service in accordance with its tariff provisions and customer expectations is highly dependent on the reliable and safe operation of its natural gas system. The O&M and capital forecasts provided herein include four technology-based projects that are intended to modernize SoCalGas' transmission and distribution system to provide continued safe and reliable service while mitigating risk. These efforts are consistent with SoCalGas' philosophy of achieving operational excellence while judiciously balancing the following corporate tenets:

- To conduct all operations with an institutionalized safety-first culture which mitigates risks to employees, contactors and the public;
- To provide cost-effective, reliable delivery of natural gas to 6.4 million metered customers; and
- To meet all legal and regulatory obligations imposed by local, state, and federal entities.

Table MAB-1 below presents a summary of the Major Projects and Construction Non-Shared O&M forecast. The change in cost between base-year 2016 and test year 2019 principally reflects the O&M amounts required to support the four technology-based capital projects described herein. These include a Distribution Operations Control Center, Pipeline Information Management System, and the associated installation of methane monitoring sensors and fiber-optic monitoring stations.

**TABLE MAB-1**

**Major Projects and Construction – Non-Shared O&M Forecast**

| GAS MAJOR PROJECTS (In 2016 $) | | | |
|---|---|---|---|
| Major Projects and Construction O&M | **2016 Adjusted-Recorded (000s)** | **TY 2019 Estimated (000s)** | **Change (000s)** |
| Total Non-Shared Services | 1,258 | 3,971 | 2,713 |
| **Total O&M** | **1,258** | **3,971** | **2,713** |

The following Table MAB-2 presents a summary of the Major Projects and Construction capital forecast that includes four projects planned to modernize and support the safe and effective operation of our gas transmission and distribution pipelines through technology-based monitoring and/or control system deployments. As noted above, these include a Distribution Operations Control Center, Pipeline Information Management System, and the associated installation of field methane monitoring sensors and fiber-optic monitoring stations along select high-pressure pipelines.

**TABLE MAB-2**

**Major Projects and Construction - Capital Forecast**

| GAS MAJOR PROJECTS (In 2016 $) | | | | |
|---|---|---|---|---|
| **Major Projects and Construction Capital Projects** | **2016 Adjusted-Recorded** | **Estimated 2017 (000s)** | **Estimated 2018 (000s)** | **Estimated 2019 (000s)** |
| DISTRIBUTION OPERATIONS CONTROL CENTER | 0 | 400 | 3,156 | 25,901 |
| METHANE MONITORS & FIBER-OPTIC PROJECTS | 0 | 300 | 4,813 | 4,813 |
| PIPELINE INFRASTRUCTURE MONITORING SYSTEM | 0 | 500 | 1,000 | 7,000 |
| **Total Capital** | **0** | **1,200** | **8,969** | **37,714** |

The O&M and capital forecast, along with the supporting information provided herein, reflects SoCalGas' commitment to sustaining safe and reliable service to our customers through the incorporation of technology-based infrastructure while also striving to control project costs without compromising safety or regulatory compliance.

# REVISED SOCALGAS DIRECT TESTIMONY OF MICHAEL A. BERMEL (GAS MAJOR PROJECTS)

## I. INTRODUCTION

### A. Summary of Gas Major Projects Costs and Activities

My testimony supports the Test Year (TY) 2019 forecasts for operations and maintenance (O&M) costs for non-shared O&M activities, and capital project costs for the forecast years 2017, 2018, and 2019 associated with the Major Projects and Construction (MPC) organization Cost Centers 2200-2529, 2200-2391, 2200-2576, 2200-2552, 2200-0317, 2200-2394, and 2200-2530.

MPC manages major projects associated with pipeline installation, replacement, and modernization, including valves, regulating and metering stations and appurtenances, and other similar projects associated with compressor stations, storage fields, and natural gas fueling stations. Tables MAB-1 and MAB-2 summarize my sponsored O&M and Capital forecasts, respectively. Where my testimony includes capital funding for projects which will have some assets placed in service in or prior to TY 2019, the costs to maintain those assets are included in this testimony as incremental to base year 2016 O&M under Cost Center groupings 2200-2529, 2200-2391, and 2200-2576.

### B. Summary of Safety and Risk-Related Costs

Certain costs sponsored in my testimony are driven by activities described in SoCalGas and SDG&E's November 30, 2016 Risk Assessment Mitigation Phase (RAMP) Report.[1] The RAMP Report presented an assessment of the key safety risks of SoCalGas and SDG&E and proposed plans for mitigating those risks. As discussed in the Risk Management and Policy testimony of Diana Day and Jamie York (Exhibit SCG/SDG&E-02, Chapters 1 and 3, respectively), the costs of risk-mitigation projects and programs were translated from that RAMP Report into individual witness areas.

One capital project sponsored by this testimony is categorized as a RAMP project under Chapter 10 of our RAMP Report, specifically under "Catastrophic Damage Involving Medium-Pressure Pipeline Failure." To strengthen our ability to prevent and manage risk under this

[1] I.16-10-015/I.16-10-016 Risk Assessment and Mitigation Phase Report of San Diego Gas & Electric Company and Southern California Gas Company, November 30, 2016. Please also refer to Exhibit SCG-02/SDG&E-02, Chapter 1 (Diana Day) for more details regarding the utilities' RAMP Report.

category, SoCalGas proposes a Distribution Operations and Control Center (DOCC) to provide continuous monitoring and oversight of its gas distribution pipeline system. The DOCC will be co-located with the SoCalGas Gas Control center, which manages transmission system operation. Both capital and O&M forecasts for the DOCC are included in this testimony.

Table MAB-3 provides a summary of the RAMP-related O&M costs and Table MAB-4 provides a summary of the RAMP-related capital costs. Justification for the DOCC project is discussed in the Gas Control and System Operations/Planning testimony of Devin Zornizer (Exhibit SCG-13) while the capital forecasts for this work ($26 million through 2019 and project total of $108 million through 2021) are presented in Section IV of my testimony.

**TABLE MAB-3**

**Summary of RAMP O&M**

| GAS MAJOR PROJECTS (In 2016 $) | | | |
|---|---|---|---|
| **RAMP Risk Chapter** | **2016 Embedded Base Costs (000s)** | **TY2019 Estimated Incremental (000s)** | **Total (000s)** |
| SCG-10 Catastrophic Damage Involving Medium-Pressure Pipeline Failure | 0 | 1,398 | 1,398 |
| **Total O&M** | **0** | **1,398** | **1,398** |

**TABLE MAB-4**

**Summary of RAMP Capital**

| GAS MAJOR PROJECTS (In 2016 $) | | | |
|---|---|---|---|
| **RAMP Risk Chapter** | **2017 Estimated RAMP Total (000s)** | **2018 Estimated RAMP Total (000s)** | **2019 Estimated RAMP Total (000s)** |
| SCG-10 Catastrophic Damage Involving Medium-Pressure Pipeline Failure | 400 | 3,156 | 25,901 |
| **Total Capital** | **400** | **3,156** | **25,901** |

While preparing my GRC forecasts, I continued to evaluate the scope, schedule, resource requirements and synergies of RAMP-related projects and programs, so the final representation of RAMP costs may differ from the ranges shown in the original RAMP Report.

### C. Summary of Costs Related to Fueling our Future Policy (FoF)

As described in the Fueling our Future Policy testimony of Hal Snyder and Randall Clark (Exhibit SCG/SDG&E-03), SoCalGas and SDG&E initiated the Fueling our Future (FoF)

program in May 2016 to identify and implement operational improvements targeting cost efficiencies. My testimony addresses FoF sub-initiatives that result in improvements and efficiencies within Major Projects Construction. The savings represented below are for a reduction in labor and associated employee expenses required to manage O&M-funded projects on the high-pressure gas pipeline system as a result of implementing FoF Ideas 60, 70 and 920. These savings are represented solely in Cost Center 2200-2529 in this testimony for clarity in explanation and cost-tracking in this Application. In practice, these cost savings ultimately may be distributed among twenty or more SoCalGas Cost Centers in years 2017-2019. Table MAB-5 below shows the FoF savings associated with areas in my testimony to be $423,000 by TY 2019.

**TABLE MAB-5**

**Summary of FoF-Related Benefits**

| GAS MAJOR PROJECTS (In 2016 $) | | | |
|---|---|---|---|
| **FoF O&M** | **Estimated 2017 (000s)** | **Estimated 2018 (000s)** | **Estimated 2019 (000s)** |
| 2MP001.000, MAJOR PROJECTS MANAGEMENT & OUTREACH | -86 | -334 | -423 |
| **Total O&M** | **-86** | **-334** | **-423** |

### D. Summary of Aliso-Related Costs

In compliance with D.16-06-054,[2] the Aliso Incident Expenditure Requirements testimony of Andrew Steinberg (Exhibit SCG-12) describes the process undertaken so the TY 2019 forecasts do not include the additional costs from the Aliso Canyon Storage Facility gas leak incident (Aliso Incident) and demonstrates that the itemized recorded costs are removed from the historical information used by the impacted GRC witnesses.

As a result of removing historical costs related to the Aliso Incident from Major Projects and Construction adjusted recorded data, and in tandem with the forecasting method(s) employed and described herein, additional costs of the Aliso Incident response are not included as a component of my Test Year 2019 funding request. Historical Major Projects and Construction costs that are related to the Aliso Incident are identified in Table MAB-6 below and removed as adjustments in my workpapers (Exhibit SCG-08-WP).

Personnel in Major Projects and Construction supported the Company in responding to the Aliso Incident throughout 2016. Major Projects and Construction resources contributed to

[2] D.16-06-054, mimeo., at 332 (Ordering Paragraph 12) and 324 (Conclusion of Law 75).

incident command, community outreach and reimbursement program activities, among others. The Aliso Incident support created a one-time deferral of several O&M initiatives, including full implementation of some FoF sub-initiatives, project and contractor standards, and developing an implementation plan for American Petroleum Institute (API) standard 1173. Activities like these are core to our ongoing mission to support policies, procedures, and programs that allow for the effective utilization of capital and management of projects. To represent core work that would have occurred but for the Aliso Incident, and work that is expected to occur in the future, $185,000 was added back to the 2017-2019 O&M forecast for Cost Center 2200-2529, represented in the excerpt from workpaper "2MP001.000" shown below and detailed in Exhibit SCG-08-WP.

**TABLE MAB-6**

**Aliso Incident Support (2016 Base Year Adjustment-Subtractions)**

| GAS MAJOR PROJECTS (In $ 2016) | | | |
|---|---|---|---|
| **Workpaper** | **2015 Adjustment (000s)** | **2016 Adjustment (000s)** | **Total (000s)** |
| 2MP001.000, MAJOR PROJECTS MANAGEMENT & OUTREACH* | 0 | -185 | -185 |
| 2MP002.000, PROJECT & CONSTRUCTION MANAGEMENT | 0 | -14 | -14 |
| 2MP003.000, PROJECT CONTROLS AND ESTIMATING | 0 | -17 | -17 |
| **Total Non-Shared O&M** | **0** | **-215** | **-215** |

### E. Organizational Overview and Mission for Gas Major Projects

SoCalGas is in the midst of an extraordinary period for Major Projects and Construction due to capital expenditures driven primarily by regulatory requirements, pursuit of operational excellence, technology advances, safety, risk mitigation, and aging infrastructure. SoCalGas recognizes the forward-looking challenges and opportunity as well as its responsibility to plan, manage, track, and commission projects with efficacy and cost optimization in accordance with best practices principles. Toward this objective, in 2013 SoCalGas formed the Major Projects and Construction team to manage large capital projects and to develop and manage standardized protocols and governance for planning, cost estimating, risk analysis, mobilization, execution, commissioning, and close-out.

The organization is composed of the following groups:

- Major Projects Management, Outreach, and Regulatory Planning & Analysis (Consolidated Cost Centers 2200-2529, 2200-2391 and 2200-2576);
- Project Management and Construction – Pipelines and Compressor Stations (Consolidated Cost Centers 2200-2552 and 2200-0317); and
- Project Controls & Estimating (Consolidated Cost Centers 2200-2394, 2200-2530).

The organization has provided, and will continue to provide, planning and oversight of major projects and implementation procedures and protocols across the Company to uniformly drive how major project work is conducted and various components are managed, including contractor performance and financial reporting and controls. The suite of projects typically managed by this organization is related to those pipeline and/or gas handling facilities which have an expansive scope and/or present unique issues relating to permitting, customer outreach, or complex synchronization with multiple agencies or in-flight projects. Projects outside this group's purview include those where a special regulatory filing has been approved and/or a related Program Management Office has been established, such as Advanced Meter Infrastructure, Pipeline Safety Enhancement Plan and Aliso Canyon Turbine Replacement. Nevertheless, some projects in these categories may be supported by MPC's regulatory, cost estimation, and control activity, and may be subject to policies and programs developed and/or managed by MPC.

The total capital work which was under preliminary planning or execution by MPC exceeded $1 billion in 2016, and this number is expected to grow to $2 billion by 2019. A significant portion of this capital is sponsored under the direct testimony of other witnesses, including the Underground Storage testimony of Neil Navin (Exhibit SCG-10) and the joint Gas Transmission testimony of witnesses Beth Musich and Michael Bermel (Exhibit SCG-07).

There are, however, three specific pipeline operations-related capital project elements for which funding is requested in this testimony. They are:

- Distribution Operations and Control Center (DOCC);
- Pipeline Monitoring Sensors (Methane and Fiber-Optic); and
- Pipeline Information Management System (PIMS).

Enterprise-wide O&M and capital funding requests for all aspects of these system developments through 2019 are included in my testimony in order to convey the scope of

implementation and operation in a convenient single volume. Each of these projects has an execution plan and schedule framework which includes capital placement in-service in a phased manner during or preceding the test year, and in some cases with additional phases extending beyond this General Rate Case cycle. The forecast through 2019 is presented in this testimony and, to provide context, the full implementation cost for each of the projects also is provided. The capital for these projects is $37 million through 2019 and $150 million through 2021.

The MPC team typically conducts its major projects work with capital funding; however, approximately fifteen percent (15%) of the work performed by this organization of 55 employees and associated costs is expensed as O&M. These costs include:

- Salaries and related non-labor expenses for management and leadership personnel not engaged directly in specific capital work, including a Vice-President, Director, and supporting administrative staff;
- Labor and non-labor cost associated with projects categorized as replacement in-kind for some gas handling assets or re-testing of assets to support continuing operations;
- Labor and non-labor costs expended for potential/preliminary projects and initiatives which are studied and evaluated but ultimately not constructed due to cost, complexity or selection of an alternative;
- Software systems/licensing agreements not otherwise covered under capital;
- Tools and equipment used by employees not subject to capitalization;
- Training and development of employees (typically project managers and cost estimator/control personnel) which are not directly related to commissioning a specific project;
- Consultants and contracted services to support any of the above elements; and
- Developing and managing contracts for select pipeline construction work conducted on the SoCalGas system.

This testimony supports SoCalGas' O&M request in support of these activities in the MPC organization.

## II. RISK ASSESSMENT MITIGATION PHASE AND SAFETY CULTURE

My testimony will address one element of SoCalGas' RAMP Report, as summarized in Table MAB-7 below. Chapter SCG-10 entitled "Catastrophic Damage Involving a Medium

Pressure Pipeline Failure" evaluates the risk of damage caused by a medium-pressure pipeline failure event which results in catastrophic consequences.

**Table MAB-7**

**SoCalGas RAMP Risks Summary**

| RAMP Risk | Description |
|---|---|
| SCG-10 Catastrophic Damage Involving Medium-Pressure Pipeline Failure | This risk relates to the public safety and property impacts that can result from failure of medium-pressure pipelines (60 psi and less). |

SoCalGas is planning to develop a Distribution Operation Control Center (DOCC) to mitigate this identified risk. Additional detail on the DOCC is provided in my Capital Workpapers Exhibit SCG-08, Workpaper Group 343 Appendix A. The RAMP-related O&M costs associated with the DOCC is presented in Table MAB-8 below. Similar to our traditional Gas Control function, whereby SoCalGas operators monitor the natural gas transmission system, the DOCC will allow trained operators to monitor and control the natural gas distribution system.

**TABLE MAB-8**

**Workpaper Identification of RAMP-Related O&M**

| GAS MAJOR PROJECTS (In 2016 $) | | | |
|---|---|---|---|
| **SCG-10 Catastrophic Damage Involving Medium-Pressure Pipeline Failure** | **2016 Embedded Base Costs (000s)** | **TY2019 Estimated Incremental (000s)** | **Total (000s)** |
| 2MP001.000, MAJOR PROJECTS MANAGEMENT & OUTREACH | 0 | 1,398 | 1,398 |
| **Total** | **0** | **1,398** | **1,398** |

When developing the DOCC project scope, SoCalGas considered various alternatives prior to selecting the current DOCC scope. The current scope includes a centralized integrated real-time monitoring system for Gas Transmission and Gas Distribution. Some alternatives SoCalGas considered would have allowed for monitoring but without controls, which would limit responsiveness in emergency situations, while others would have allowed for control but with limited monitoring. For example, SoCalGas considered using hourly reads via the Electronic Pressure Monitoring Systems (EPMS) whereby data only would have been available

each hour. This alternative would have cost less, but would have defeated the purpose of being able to monitor and respond to changing distribution system demands in real-time.

As illustrated in Table MAB-9, part of our requested capital for the DOCC is linked to mitigating safety risks that have been identified in SoCalGas' RAMP Report.

**TABLE MAB-9**

**Risk Assessment Mitigation Phase Capital Forecast**

| **GAS MAJOR PROJECTS (In 2016 $)** | | | |
|---|---|---|---|
| **SCG-10 Catastrophic Damage Involving Medium-Pressure Pipeline Failure** | **2017 Estimated RAMP Total (000s)** | **2018 Estimated RAMP Total (000s)** | **2019 Estimated RAMP Total (000s)** |
| 003430.001, RAMP - Incremental Post Filing Distribution Operations Control Center | 400 | 3,156 | 25,901 |
| **Total** | **400** | **3,156** | **25,901** |

MPC's commitment to safety is embedded in every aspect of its mission to manage the cost-effective construction of natural gas pipelines, compressor stations, interconnect facilities and related pressure control assets so that we can continue to provide safe and reliable natural gas service to 6.4 million metered customers while maintaining compliance with applicable regulatory and environmental regulations. The importance of a ubiquitous safety culture is evident in the day-to-day operation and maintenance of Company assets and systems. The MPC organization's specific focus on safety in support of that mission includes development of a trained workforce, utilizing appropriate construction contractors, and use of best-in-class methods and procedures, equipment, materials and recordkeeping processes. All facilities are designed, constructed and tested to meet or exceed applicable industry codes and standards.

An effective safety culture requires developing and maintaining a qualified workforce. This includes the ongoing transfer of historical operational knowledge. Major Projects and Construction works with Human Resources to develop a strategy to promote knowledge transfer throughout its organization. We ensure that critical skills are transitioned to employees, which aids in the mitigation of risk associated with not having qualified resources.

Gas Contractor Controls (GCC) coordinates with Supply Management and holds quarterly meetings with our twelve signatory pipeline construction, shallow well anode, and as-built survey contractors. At these meetings we review contractor work quality and overall performance ratings. Supply Management coordinates additional meetings with other types of

contractors as well. The meetings are used to present and discuss the quality and performance ratings data to the contractors.

It is SoCalGas' goal to centralize capture of all data and make it available in real time. Project owners document overall performance of pipeline construction contractors. GCC gathers and analyzes this data and works with contractors to address any issues identified. This data is recorded in FACT (Field Audit Collection Tool) and is available electronically. Construction inspectors complete various inspection forms to document pipeline construction quality. Distribution pipeline construction inspection findings are recorded in FACT.

## III. NON-SHARED O&M COSTS

"Non-shared services" are activities that are performed by SoCalGas solely for its own benefit (*i.e.,* not for that of San Diego Gas & Electric Company). Table MAB-10 summarizes the total non-shared O&M forecasts for MPC while Table MAB-11 shows the forecast by cost center groupings.

**TABLE MAB-10**

**Non-Shared O&M Summary of Costs**

| GAS MAJOR PROJECTS (In 2016 $) | | | |
|---|---|---|---|
| **Categories of Management** | **2016 Adjusted-Recorded (000s)** | **TY 2019 Estimated (000s)** | **Change (000s)** |
| MAJOR PROJECTS | 1,258 | 3,971 | 2,713 |
| **Total Non-Shared Services** | **1,258** | **3,971** | **2,713** |

**TABLE MAB-11**

**Non-Shared O&M by Cost Center**

| GAS MAJOR PROJECTS (In 2016 $) | | | |
|---|---|---|---|
| MAJOR PROJECTS | **2016 Adjusted-Recorded (000s)** | **TY 2019 Estimated (000s)** | **Change (000s)** |
| MANAGEMENT & OUTREACH (Cost Centers 2200-2259, 2200-2391, 2200-2576) | 933 | 3,646 | 2,713 |
| PROJECT & CONSTRUCTION MANAGEMENT (Cost Centers 2200-2552 & 2200-0317) | 201 | 201 | 0 |
| PROJECT CONTROLS (Cost Center 2200-2394) | 124 | 124 | 0 |
| **Total** | **1,258** | **3,971** | **2,713** |

All Cost Center groupings in this testimony are forecasted using a base year (2016) reference. The O&M forecast and elements driving change between the base year cost and 2019 forecast for each of the MPC Cost Center groupings are provided in Table MAB-12 below for forecast years 2017 and 2018 to depict the growth in O&M between the base year and test year for illustrative purposes.

**TABLE MAB-12**

**Summary of Cost Center Adjustment Elements for O&M Cost Grouping**

| Line Item | Cost Centers and O&M Expense Element | 2016-Adj (000s) | Estimated 2017 (000s) | Estimated 2018 (000s) | Estimated 2019 (000s) |
|---|---|---|---|---|---|
| **A-1** | 2200-2259, 2200-2391, 2200-2576 Historical base year 2016 work/expenses | 933 | 933 | 933 | 933 |
| **A-2** | 2200-2259, 2200-2391, 2200-2576 Enterprise-wide additions for Dist. Op. and Control Center O&M | 0 | 0 | 17 | 1,398 |
| **A-3** | 2200-2259, 2200-2391, 2200-2576 Additions for Pipeline Information Management System (Enterprise-wide). Fiber and Methane system-wide support – O&M | 0 | 0 | 656 | 1,553 |
| **A-4** | 2200-2259, 2200-2391, 2200-2576 FoF Savings. Project Management personnel reduction system-wide due to FoF initiatives 60, 70 and 920. O&M Project Management efficiency gains. | 0 | -83 | -207 | -422 |
| **A-5** | Adjustment for work deferred in 2016 due to staffing and required focus on special assignment accounted for in cost center. | 0 | 185 | 185 | 185 |
| **A-6** | Project & Construction Management – Facilities (2200-2552) & Pipelines (2200-0317). Base work | 201 | 200 | 200 | 200 |
| **A-7** | Project Controls & Estimating (Cost Center 2200-2394) Base Work | 124 | 124 | 124 | 124 |

| | | | | | |
|---|---|---|---|---|---|
| | **Total O&M** | **1,258** | **1,359** | **1,909** | **3,971** |

Only Cost Center grouping 2200-2259/2200-2291/2200-76 (Management and Outreach) shows a forecasted change from adjusted 2016 recorded costs. These changes are due to:

- O&M expenses across various SoCalGas organizations associated with four capital projects for which funding is requested in this testimony and which will have significant assets placed in service in or before TY 2019. The reason for placing those O&M additions in this single Cost Center grouping is to provide context as to the full impact of these projects' associated assets on future O&M costs across SoCalGas organizations. These costs are represented under Line Items A-1, A2, and A-3 in Table MAB-12;
- Savings across various SoCalGas organizations in project management staffing and associated costs as a result of the Company's FoF initiative, specifically Initiatives 60, 70, and 920, referenced under Line Item A-4 in Table MAB-12; and
- Adjustment of 2016 recorded costs for base O&M work deferred in 2016 due to redirecting certain Cost Center employees to the Aliso Incident. This adjustment is shown under Line Item A-5 in Table MAB-12.

These changes are chronicled in more detail in my O&M Workpapers, Exhibit SCG-08-WP and in my Capital Workpapers Exhibit SCG-08, Workpaper Group 343, Appendix A and Appendix B. The incremental O&M costs associated with the capital projects are discussed in the following Cost Center grouping overview.

## A. Major Project Management and Outreach

**TABLE MAB-13**

**Gas Major Projects Management & Outreach O&M**

| **GAS MAJOR PROJECTS (In 2016 $)** | | | | |
|---|---|---|---|---|
| GAS MAJOR PROJECTS | **2016 Adjusted-Recorded (000s)** | **Estimated 2017 (000s)** | **Estimated 2018 (000s)** | **Estimated 2019 (000s)** |
| MANAGEMENT & OUTREACH | 933 | 1,032 | 1,272 | 3,646 |

### 1. Description of Costs and Underlying Activities

The Cost Centers shown above are combined for planning purposes as they relate to general management of staff and associated organizational costs. The cost history and forecast

details are shown in Table MAB-13 above and, for illustrative purposes, forecast years 2017 and 2018 depict the growth in O&M between the base year and test year.

This Cost Center grouping, which is presented as consolidated Cost Centers 2200-2529, 2200-2391 and 2200-2576, includes the office of Vice President of Gas Major Projects and Gas Engineering, the Director of Major Projects and Construction, administrative support, and a small staff of personnel supporting MPC policies, procedures, strategy, and compliance. This Cost Center grouping includes regulatory and program management personnel who prepare regulatory filing information in support of major capital projects. This team provides research, participates in the regulatory process, and executes other related tasks. Personnel in this Cost Center grouping also research and help formulate strategy and impact analyses for prospective projects and initiatives which are not exclusively capital-funded (e.g., AB 1371 utility compliance, developing plans to conform to API standard 1173, implementing Renewable Gas receipt programs and planning for emergency response). Other routine expenses are incurred for:

- Labor time spent in support of projects categorized as O&M;
- Employee training, travel and related expenses not covered under capital;
- Third-party software support not specifically allocated to capital projects; and
- Tools, equipment and office supplies not included in capital project funding provisions.

Included in the O&M forecast for this Cost Center grouping is the O&M cost associated with all capital projects presented in this testimony where assets are to be installed and placed in service prior to or during test year 2019. There are four major technology-based projects which will be placed in service in phases through 2021. The projects and associated O&M are briefly described below and discussed in more detail in the capital section of this testimony and in my Workpapers Exhibit SCG-08, Workpaper Group 343, Appendix A and Appendix B.

**B. Distribution Operations Control Center O&M**

SoCalGas proposes to construct and operate a centralized Supervisory Control and Data Acquisition (SCADA) system and related DOCC facility to continuously monitor and control select distribution pipelines in real-time. The DOCC System, when completed, will include the field installation and/or integration of over 3,000 distribution pipeline monitoring points and control of over 300 valve and regulator station assets. While the system will not be completed

until 2022, select assets will be placed in service in 2018 and 2019 and will require maintenance and operating resources in and/or prior to TY 2019. Approximately 500 distribution pipeline control and/or monitoring station installations/modifications will occur in 2018 and 2019 and will be monitored in real-time from staff at SoCalGas' Gas Control facility.

The O&M additions to this Cost Center grouping include hiring and training new Gas Control staff, their salaries, and those labor costs and associated expenses to maintain and operate installed field and Gas Control assets, including an expanded SCADA system. Maintenance costs ultimately will impact numerous Cost Centers across the Company in distribution operations (Measurement and Regulation), Gas Control and Gas Engineering. The consolidated cost for all SoCalGas O&M associated with the DOCC are included in this Cost Center grouping for ease of understanding and tracking in this proceeding. Accordingly, they are *not* duplicated in any other witness testimony or forecasts. O&M costs forecasted for the DOCC are zero-based and derived from: (1) the number of new remote control and monitoring sites commissioned in years 2018 and 2019, (2) physical changes to our Gas Control facility and related systems to accommodate the new field monitoring and control sites, and (3) the staffing to provide for five rotating shifts of personnel to monitor the new asset base. Details on the assumptions used to derive O&M costs are further described in my Workpapers Exhibit SCG-08, Workpaper Group 343, Appendix A.

### C. Pipeline Information Management System, Methane and Fiber-Optic Monitoring O&M

In its 2011 Pipeline Safety Enhancement Plan (PSEP) submission (A.11-11-002 and R.11-02-019), SoCalGas and SDG&E proposed to implement a Pipeline Infrastructure Management System, which is more appropriately referred to in this testimony as the Pipeline Information Management System (PIMS). PIMS is based on emerging technologies and is proposed specifically to monitor and manage information from sensors placed along our large pipeline routes to determine when the pipeline is leaking and/or subjected to non-native impact, vibration, strain or temperature gradients. The monitoring scope includes approximately 2,100 methane monitoring sensors strategically located where there are large high-pressure transmission pipelines adjacent to facilities posing special occupancy density, evacuation logistics complexities or a potential for interruption to commerce. The proposed scope also includes the installation of fiber-optic cabling along the route of select transmission pipelines that are scheduled for relocation or replacement, or for new construction pipeline. The fiber-

optic cabling will provide for the monitoring of pipelines for non-native movement indicative of a dig-in, impact, subsidence or out-of-pattern strain and temperature. The system of sensors is intended to allow for pre-emptive identification and mitigation of pipeline threats and enhance our ability to manage pipeline damage. The system is described in more detail in our 2011 PSEP filing and in the capital section of this testimony under "PIMS." While SoCalGas first requested funding for this system in 2011, the Commission did not offer substantive guidance regarding direction and funding approval in D.14-06-007. Accordingly, SoCalGas has taken a measured approach to implementing this system and has used the interim period to test and evaluate modern sensing technologies and to develop, through pilot programs, the ability of its Advance Metering radio network to collect and manage data from end-points that can be fitted with different types of measuring devices, such as methane monitoring sensors. SoCalGas believes its successful pilot testing combined with technology advances warrant full deployment of the PIMS system and related sensory infrastructure by 2021. The capital cost and full scope of the system are described in the capital section of my testimony and further described in my Workpapers Exhibit SCG-08, Workpaper Group 343, Appendix B.

As SoCalGas plans to install field sensors and develop its PIMS system over the period 2017-2021, some of the assets installed and placed in service prior to the end of TY 2019 will require O&M support. The associated O&M costs, sorted by the organizations expected to incur the support costs for the PIMS, methane monitoring sensors and fiber-optic monitoring systems, are discussed in detail in my Workpapers Exhibit SCG-08, Workpaper Group 343, Appendix B.

- Maintenance associated with the calibration of over 700 methane monitoring sensors installed by the end of 2019;
- Maintenance of fiber-optic field monitoring stations to read and interpret the condition of pipeline routes relative to intrusion, vibration impact temperature and leakage. The forecast is based on four remote fiber-optic monitoring stations to be installed by the end of 2019; and
- Maintenance and operations associated with Advance Metering data, data collection and management software and data management assets employed to collect methane monitoring sensor data.

These costs are shown under line item A-3 in Table MAB-12 above. The O&M forecast for methane monitors and fiber-optic systems is zero-based and were derived from actual costs

associated with pilot testing of remote methane monitoring sensors in 2016 and our experience with costs for operating other methane monitoring equipment. The cost for the fiber-optic monitoring system installation is based on third-party vendor price quotations and our experience in installing and operating a pilot test facility in Pico Rivera, California. The costs for the PIMS central data collection and management system are based on SoCalGas' historical experience with managing enterprise systems built upon technology platforms grounded in software and related technologies. Costs include licensing, support agreements and Information Technology services from our staff. As the system also includes use of our Advanced Meter radio systems for communications, incremental support for the expansion and partitioning of that system are also included. Additional details associated with these projects are further described in my Workpapers Exhibit SCG-08, Workpaper Group 343, Appendix B.

### D. Adjustment for Fueling-our-Future Efficiencies

SoCalGas' MPC organization executes both capital projects and those projects which, by standard accounting convention, are expensed to O&M. These include the replacement of some assets in-kind and the testing of assets (such as hydro-testing pipelines for continued service integrity and compliance). SoCalGas' Fueling our Future program proffered several recommendations to improve efficiency in the management of these types of projects through planning, standardization of methods, training and streamlining project close-out activities. These efficiency gains are expected to result in a forecasted savings of the costs associated with approximately four (4) full-time employees and associated non-labor costs across SoCalGas by 2019. While these savings for projects funded under O&M ultimately may be captured in ten (10) or more individual Cost Centers across SoCalGas organizations, the savings are collectively forecasted in Cost Center 2200-2529 for context. These savings are shown in Table MAB-5 and in Table MAB-12, under item A-4. My O&M Workpapers provide additional details on how FoF sub-initiative 60, 70 and 920 efficiencies impact the forecast of Cost Centers 2200-2259, 2200-2391, 2200-2576 for each year.

#### 1. Forecast Method

The forecast for this Cost Center grouping is based on 2016 recorded costs with adjustments made for the resumption of required work activity for resources that were diverted to the Aliso Incident in 2016, additions to support the DOCC and PIMS assets, and forward-looking efficiencies attributable to implementation of FoF process improvements.

### 2. Cost Drivers

The cost drivers for the PIMS, methane monitoring and fiber-optic monitoring systems are base O&M activities to support the processes, people and governance associated with major projects, where those costs are not otherwise assignable to capital projects.

## E. Project & Construction Management – Facilities & Pipelines

**TABLE MAB-14**

**O&M for Project & Construction Management – Facilities and Pipelines**

| GAS MAJOR PROJECTS (In 2016 $) | | | | |
|---|---|---|---|---|
| **Project & Construction Management – Facilities (2200-2552) & Pipelines (2200-0317)** | **2016 Adjusted-Recorded (000s)** | **TY2017 Estimated (000s)** | **TY2018 Estimated (000s)** | **TY2019 Estimated (000s)** |
| **Total** | **201** | **201** | **201** | **201** |

### 1. Description of Costs and Underlying Activities

This Cost Center grouping, which is principally funded under capital, represents the functional expertise and resources needed to perform or assist technical development, consultation, planning, permitting, detailed design, material specifications and management, infrastructure facility construction, and the commissioning and general project management of major infrastructure projects, such as large pipelines, compressor and valve stations and interconnect facilities. The functional responsibility to oversee, maintain, and provide continuous development of construction standards and best practices for Gas Transmission and Storage infrastructure facilities, construction, and contractor services are also provided by this group under O&M funding, represented in Table MAB-14 above. O&M for this Cost Center grouping includes:

- Labor time spent in support of projects categorized as O&M;
- Employee training, travel and related expenses not covered under capital;
- Third-party software support not specifically allocated to capital projects;
- Tools, equipment and office supplies not included in capital project funding provisions; and
- Time and resources expended to establish policies, procedures, quality controls, and assessment initiatives and activity associated with pipeline construction and contractor management.

### 2. Forecast Method

Base year 2016 was used to forecast O&M for years 2017-2019 for this Cost Center grouping as it represents the most recent management configuration and O&M work conducted by this Cost Center grouping. The 2019 forecast matches the 2016 adjusted recorded cost.

### 3. Cost Drivers

The costs associated with this forecast are driven by support of capital projects across the Company through policies, procedures, strategy, and regulatory and management activity that is not otherwise assignable to O&M. The projects which drive the need typically are related to multiple factors including compliance, reliability and new business. There is no change in O&M requested for this Cost Center grouping from 2016 to 2019.

## F. Project Controls & Estimating and Gas Contractor Controls

**TABLE MAB-15**

**O&M for Project Controls & Estimating and Gas Contractor Controls**

| GAS MAJOR PROJECTS (In 2016 $) | | | | |
|---|---|---|---|---|
| **Project Controls & Estimating and Gas Contractor Controls** | **2016 Adjusted-Recorded (000s)** | **TY2017 Estimated (000s)** | **TY2018 Estimated (000s)** | **TY2019 Estimated (000s)** |
| **Total** | **124** | **124** | **124** | **124** |

### 1. Description of Costs and Underlying Activities

This Cost Center grouping, presented in Table MAB-15 above, captures the activities and expenses associated with Project Controls & Estimating and Gas Contractor Controls represented in Cost Centers 2200-2394 and 2200-2553. In 2014, SoCalGas made the commitment to expand to large and complex projects the project controls and quality, risk and compliance management utilized by PSEP. The activities conducted by the personnel in this Cost Center grouping principally are dedicated to those endeavors under capital funding. Specific activities include the following in support of major capital and some O&M-funded projects:

- Analyzing and developing cost forecasts;
- Cost estimating;
- Schedule development, updating and analysis; and
- Effectively managing the quality, safety and compliance of contractors conducting work on the Company's natural gas infrastructure.

The efforts of personnel in these Cost Center groupings typically are associated with and directly accounted for under capital funding. Supported projects include many of those discussed by Ms. Musich and Mr. Bermel (Exhibit SCG-07), Mr. Navin (Exhibit SCG-10), Mr. Buczkowski (Exhibit SCG-11), and in the Gas Distribution testimony of Gina Orozco-Mejia (Exhibit SCG-04).

O&M expenses for this organization include:

- Labor time spent in support of projects categorized as O&M;
- Employee training, travel and related expenses not covered under capital;
- Third-party software support not specifically allocated to capital projects; and
- Tools, equipment and office supplies not included in capital project funding provisions.

**2. Forecast Method**

The forecast methodology that best reflects the resource requirements for this Cost Center is indexed to base year 2016. This methodology is appropriate because it most accurately reflects the recent configuration of this team and thus the associated O&M requirements for this grouping through 2019. There is no change in O&M requested for this Cost Center grouping from 2016 to 2019.

**3. Cost Drivers**

The costs associated with this forecast are driven by support of capital projects across the Company through policies, procedures, strategy, regulatory and management related activity and employee expenses which are not otherwise assignable to O&M. The projects which drive the need typically are related to multiple areas including compliance, reliability and new business. There is no change in O&M requested for this Cost Center grouping from 2016 to 2019.

## IV. CAPITAL

### A. Introduction

**TABLE MAB-16**

**Capital Forecast for Gas Major Projects**

| GAS MAJOR PROJECTS (In 2016 $) | | | | |
|---|---|---|---|---|
| **MAJOR PROJECTS CAPITAL** | **2016 Adjusted-Recorded** | **Estimated 2017 (000s)** | **Estimated 2018 (000s)** | **Estimated 2019 (000s)** |
| DISTRIBUTION OPERATIONS CONTROL CENTER | 0 | 400 | 3,156 | 25,901 |
| METHANE MONITORING & FIBER-OPTIC MONITORING (2 distinct projects) | 0 | 300 | 4,813 | 4,813 |
| PIPELINE INFORMATION MONITORING SYSTEM | 0 | 500 | 1,000 | 7,000 |
| **Total** | **0** | **1,200** | **8,969** | **37,714** |

Table MAB-16 summarizes the total capital forecasts for 2017, 2018 and 2019. The capital projects described herein support the continued safe and effective management and operation of SoCalGas' gas transmission and distribution pipelines through the installation of modern, technology-based monitoring and/or control systems. The projects consist of the Distribution Operations Center (DOCC), installation of methane monitoring sensors and fiber-optic monitoring, and the Pipeline Infrastructure Monitoring System (PIMS).

### B. Distribution Operations Control Center

#### 1. Description of Costs and Underlying Activities

The first project, the DOCC and related system of field sensors and control assets, will strengthen SoCalGas and SDG&E's ability to manage their distribution pipeline operations system in real-time by use of modern technology including remote and automated controls and the co-location of a constantly-staffed DOCC facility with Gas Control operations. This project will allow integrated operation of the distribution and existing high-pressure transmission pipeline systems. As shown in Table MAB-16 above, the forecasts for DOCC for 2017, 2018, and 2019 are $400,000, $3,156,000, and $25,901,000, respectively. The system is proposed for build-out in phases from 2017 through 2021, and the associated capital cost is $108 million. The total capital to be expended through 2019 ($29.457 million) is requested in this GRC. The capital cost outlay and scope for this system are presented through completion in 2021 to fully inform the Commission on future activity and provide context for the forecast through 2021.

Supplemental information on the proposed system function, features, cost and technical elements are further described in my Workpapers Exhibit SCG-08, Workpaper Group 343, Appendix A. The full operational benefits of and business needs for this system are described by Mr. Zornizer (Exhibit SCG-13).

The capital forecasted for the DOCC is also linked to mitigating a safety risk that has been identified in SoCalGas' RAMP Report, as presented in Table MAB-17 below.

**TABLE MAB-17**

**Risk Assessment Mitigation Phase for DOCC Capital**

| GAS MAJOR PROJECTS (In 2016 $) | | | | |
|---|---|---|---|---|
| **SCG-10 Catastrophic Damage Involving Medium-Pressure Pipeline Failure** | **2016 Embedded Base Costs (000s)** | **TY 2017 Estimated Incremental (000s)** | **TY 2018 Estimated Incremental (000s)** | **TY 2019 Estimated Incremental (000s)** |
| 003430.001, RAMP – Incremental Post Filing Distribution Operations Control Center | 0 | 400 | 3,156 | 25,901 |
| **Total** | **0** | **400** | **3,156** | **25,901** |

The scope and history of the DOCC is derived from SoCalGas' TY 2016 General Rate Case. In it, SoCalGas and SDG&E requested funding to study technical alternatives for implementing a DOCC to control and monitor medium and high-pressure gas distribution pipelines to provide for more comprehensive, integrated and timely operation of the utilities' natural gas delivery system. This request was included in the Operations and Maintenance testimony of Frank Ayala.

Specifically, SoCalGas and SDG&E proposed the following:

*As part of their Gas Distribution Monitoring and Control Plan, SoCalGas and SDG&E will develop a plan for the future of their gas distribution control functions....SoCalGas and SDG&E will develop a blueprint covering items such as the following:*

- *Plan for the development and implementation of a Gas Distribution Control Center. This plan will assess items such as the level of integration between this new control center and the current Transmission Control Center, the dispatch function, and the Gas Emergency Centers; as well as the degree of physical and virtual integration.*
- *Plan for a centralized Control Center to utilize the integrated dispatch of personnel, gas system analysis technical support, and monitored information (electronic pressure*

*monitors and SCADA) to provide centralized and efficient emergency response on a 24/7 basis.*

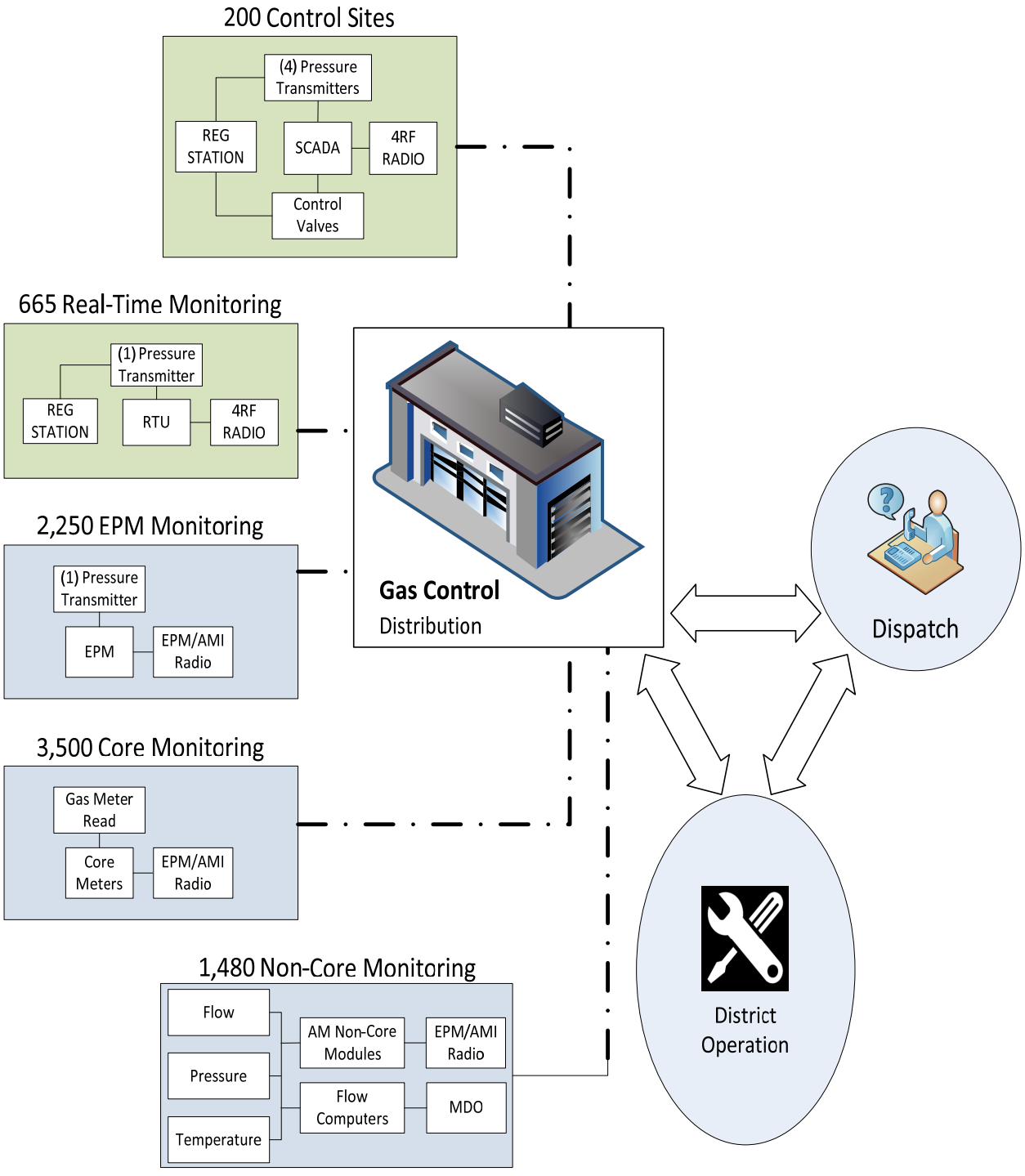
- *Plan for upgrading the SCADA system to incorporate the additional real-time operating data-telemetry communication sites throughout the distribution pipeline system. This will include recommendation of the type of communications needed for the new sites. Workforce plan for the personnel needed to staff the Control Center, and to maintain and operate the SCADA system.*
- *Plan describing the requirement for building space, equipment and technology needed for the additional personnel and facilities.*
- *Plan for the ongoing operations and maintenance of the new systems, facilities and equipment.*[3]

The Commission, in Decision D.16-06-054, authorized funding for this evaluation work. Accordingly, SoCalGas and SDG&E completed a preliminary study in 2017 addressing the foregoing scope and objectives for the DOCC. The specific findings and conclusions indicate that a modernized DOCC will increase operational efficiency, swiftness of response and ability to manage unplanned pipeline incidents and associated emergencies on both high- and medium-pressure distribution pipeline systems. Moreover, the DOCC will allow the Company to shift toward real-time monitoring and control from our point-of-receipt for gas supplies through our transmission and distribution systems and, ultimately, to our 6.4 million metered customers.

After reviewing multiple technical options and potential operational benefits, SoCalGas has concluded that a system which employs a hybrid of hourly and real-time monitoring of pipelines and control of larger distribution pipeline pressure regulating stations provides the appropriate balance of improved operational management and cost-effectiveness. SoCalGas specifically proposes and seeks cost recovery for the DOCC and associated field control and monitoring system illustrated in Figure MAB-1 below.

[3] A.14-11-004, SoCalGas 2016 General Rate Case, Exhibit SCG-04-R, Revised Direct Testimony of Frank Ayala, Gas Distribution, March 2015, pp. FBA-85 lines 14 to 30, FBA-85 lines 1 to 6.

**FIGURE MAB-1**
**Illustrative DOCC and Field Monitoring & Control – Initial Build-Out**



The summary features of the proposed DOCC and system of field monitoring and control assets include the following:

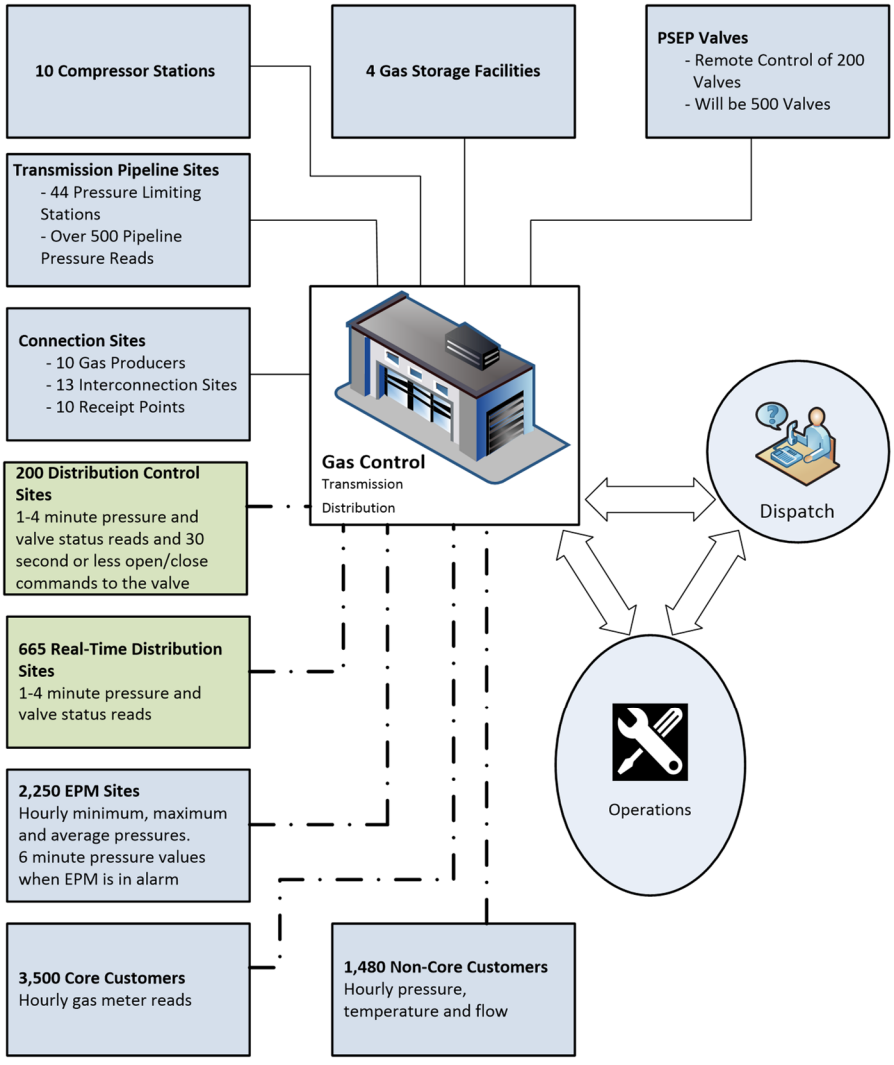
- Co-location of the DOCC with our transmission operations (Gas Control) primary and back-up facilities;
- Expansion and partitioning of the SDG&E and SoCalGas transmission SCADA system to provide for distribution monitoring and control;
- Data connectivity with SoCalGas and SDG&E Emergency Operations Center and Distribution Dispatch centers for integrated system data sharing and improved event response and communications;
- Remote control of over 200 distribution regulator stations and provide for associated flow and pressure measurement in real-time, including the ability to remotely shut-off valves and/or set/re-set pressures to manage gas flows in response to pipeline, valve and/or regulator station failures (see Appendix-A in Workpaper Group 343 in my workpaper Exhibit SCG-08-CWP, Figures 7 and 8);
- Installation of at least one real-time pressure measurement and trending data station in each of 665 medium pressure districts/zones operated by the Company (see Appendix-A in Workpaper Group 343 in my workpaper Exhibit SCG-08-CWP Figure 6);
- Monitoring over 2,500 additional system points using alarm-based notification to the Distribution Operations Control Center and provide real-time data polling capability, on-demand, to help operators determine the origin of a pressure excursion in individual pressure districts served by multiple regulator stations (the proposed alarm-based monitoring stations will be remotely configurable to monitor in real-time under abnormal/emergency situations) (see Appendix A, in Workpaper Group 343 in my workpaper Exhibit SCG-08-CWP Figure 3);
- Hourly consolidated flow information from up to 5,000 core and non-core metering sites to provide for improved intra-day load forecasting (see Appendix A, in Workpaper Group 343 in my workpaper Exhibit SCG-08-CWP Figures 4 and 5);

- Use of hybrid communications which employ use of the SoCalGas Advanced Meter radio system, commercial data communication assets and the Company's wide-area SCADA network;
- Possible use of the SDG&E Smart Meter radio system after a proposed upgrade post-2019 (no cost for this work is included in this request); and
- Associated staff augmentation to manage an expanded set of real-time operational data field assets and central SCADA, Advanced Meter and communication assets.

When the full build-out of the DOCC and field assets are completed and commissioned, the integrated monitoring and control of the combined Transmission Gas Control and DOCC operations will embody the assets and functions depicted in Figure MAB-2 below.

**FIGURE MAB-2**

**Illustrative DOCC and Field & Monitoring - Full Build-Out**



### 2. Forecast Method

The forecast method utilized for the DOCC is zero-based and was developed using a combination of historical costs for SCADA and field asset installation comparable to those proposed, Company labor rates associated with Company employees planned to design/commission, and confirmed licensing and system expansion costs. Formal equipment quotations were also used to develop the DOCC capital cost estimate. DOCC-related field monitoring sites will be installed and tied into the existing Transmission Gas Control facility in 2018 and 2019. These assets will be placed in service and some operational and maintenance expenses will be incurred across multiple SoCalGas Cost Centers in 2018 and 2019. All associated O&M costs are included in this testimony under the following Cost Center groupings: 2200-2529, 2200-2391, 2200-2576.

### 3. Cost Drivers

The costs for all capital associated with this request are included in this testimony, including those spent in organizations other than MPC. The underlying cost drivers for this capital project relate to the purchase of equipment, engineering and planning, and Information Technology systems purchase, lease and configuration.

Additional cost details are shown in Workpaper Group 343 in my workpaper Exhibit SCG-08-CWP section A1 of Appendix A.

## C. PIMS and Pipeline Monitoring

### 1. Description of Costs and Underlying Activities

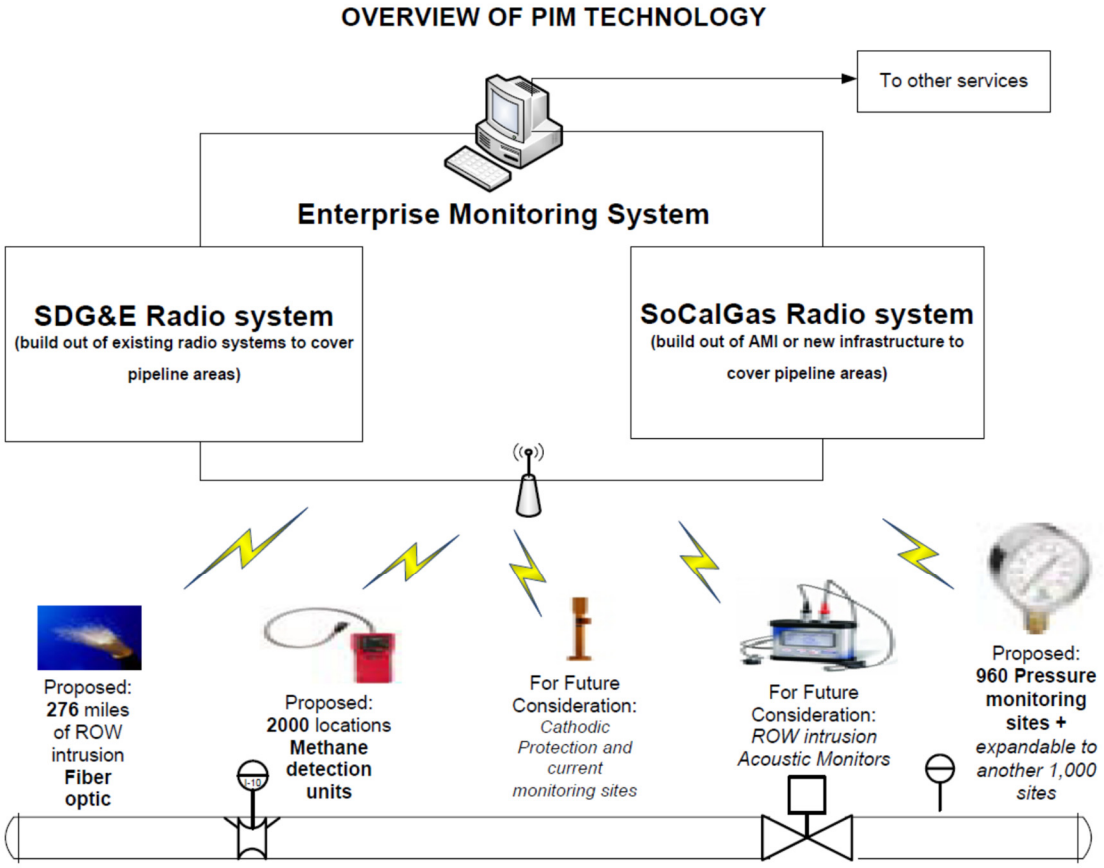
SoCalGas and SDG&E plan the development and implementation of a modern, centralized data system of field sensors and computerized data management assets to monitor conditions (external to the pipe) in real-time along the routes and rights-of-way of large high-pressure gas pipelines to provide early warning, timely response and mitigation of potential external threats to the physical integrity of the pipelines. This system will link with multiple Company information systems to provide for data sharing, historical trending and dispatching of personnel in the event of an emergency. As shown in Table MAB-16 above, the forecasts for PIMS for 2017, 2018, and 2019 are $500,000, $1,000,000, and $7,000,000, respectively.[4] Full implementation of these projects will extend through 2021, with capital being placed in service

[4] Supplemental Workpapers (Exhibit SCG-08-CWP, Workpaper Group 003430) supporting the detailed forecast of PIMS may reflect slightly different costs due to rounding.

in each year commencing in 2018. Each of these systems is discussed further in this capital testimony. The second aspect of PIMS involves the installation of field sensors (one project for methane monitoring and another for fiber-optic monitoring), instrumentation and related assets which will feed information to the to-be-developed PIMS in real-time to enable our system operators and maintenance personnel to identify abnormal activity occurring along major pipelines and quickly dispatch personnel to the field to investigate and mitigate associated threats. Although this is detailed as a separate project in the Methane and Sensor discussion in this testimony, the two are interrelated. See Figure MAB-3 below.

**FIGURE MAB-3**

**Interrelation of Methane Monitoring Sensors and Fiber-Optic with PIMS**




The monitoring asset scope includes:

- 2,100 methane monitoring sensors strategically located where our large high-pressure pipelines are routed adjacent to critical facilities posing special

occupancy density, evacuation logistics complexities or a potential for interruption to commerce.

- Installation of fiber-optic cabling installed along the route of large pipelines. This cabling and associated field analyzer equipment will allow SoCalGas to monitor pipelines for non-native movement indicative of a dig-in, impact, subsidence or out-of-pattern strain and temperature.

The PIMS and related system of sensors are proposed specifically to provide for pre-emptive identification and mitigation of pipeline threats and to enhance our ability to manage through and around pipeline damage incidents.

The field instrumentation asset projects include the following:

- Computerized monitoring systems installed in the field to read the movement of fiber-optic cabling routed along pipelines to detect leakage, non-native strain, ground movement and impact resulting from physical integrity threats; and
- Installation of 2,100 methane monitoring sensors on large pipelines routed in areas with high-occupancy facilities and special evacuation or commerce considerations in order to measure the concentration of natural-gas-in-air to determine in real-time whether a leak is occurring.

**2. Forecast Method**

The forecast method developed for this project is zero-based. The labor cost forecasts associated with PIMS are based on recent experience by the respective IT system owners, which include past experience with IT system enhancement and data transfer interface development, testing and deployment of system capabilities and system enhancements similar in size and scope. As SoCalGas plans to install field sensors and develop its PIMS system from 2017-2021, some of the assets installed and placed in service prior to the end of TY 2019 will require operational and maintenance support. The associated expenses, referenced by organization expected to incur the support cost for the PIMS, are described in detail in Workpaper Group 343 in my workpaper Exhibit SCG-08-CWP Appendix B, Table 2.

**3. Cost Drivers**

The underlying cost drivers for this capital project break down into four major resource categories: labor resources, hardware, software and vendor services. These are described in Workpaper Group 343 in my workpaper Exhibit SCG-08-CWP Table 4 of Appendix B, PIMS

Capital Cost Forecast Detail. Costs identified include the contract labor associated with the development, testing and implementation support for the various system upgrades, enhancements and data transfer interface development, including those associated with existing software (SAP, OSI PI, GIS), and Advanced Meter and Smart Meter systems. Hardware costs include those for GIS QA and Production SQL servers. Software costs include expenditures for related system software, system enhancements and licensing for related systems. Vendor services include the costs associated with professional services provided by software vendors to support the development and implementation of related enhancements. See Table 4 in Appendix B in Workpaper Group 343 in my workpaper Exhibit SCG-08-CWP for detailed expenditure descriptions, estimated hourly rates or units, total hours estimated or cost per unit, and annual cost allocation.

**D. Fiber-Optic Monitoring and Methane Monitoring**

**1. Description of Costs and Underlying Activities**

As provided in Table MAB-16 above, the forecast for the fiber-optic and methane monitoring projects for 2017, 2018, and 2019 are $300,000, $4,813,000, and $4,813,000, respectively. For the Fiber and Methane projects, SoCalGas and SDG&E have committed in their planning for new pipelines to route fiber-optic cabling along newly installed pipe sections which are 12" or greater in diameter and more than one mile in contiguous length. The fiber typically will be installed 12" above the pipeline. The Company expects to install fiber-optic monitoring stations and place into production a system when at least five miles of contiguous fiber is installed along a pipeline route. These stations will light the fiber and provide warning to operations and field response personnel when non-native stress, strain, impact or temperature gradients occur along a pipeline route. The monitoring stations will report any abnormal activity to the PIMS where it can be viewed, acknowledged and resolved. See Figures MAB-4 and MAB-5 below.

**FIGURE MAB-4**

**Illustration of Pipeline Information Management System and Fiber-Optic Cabling**

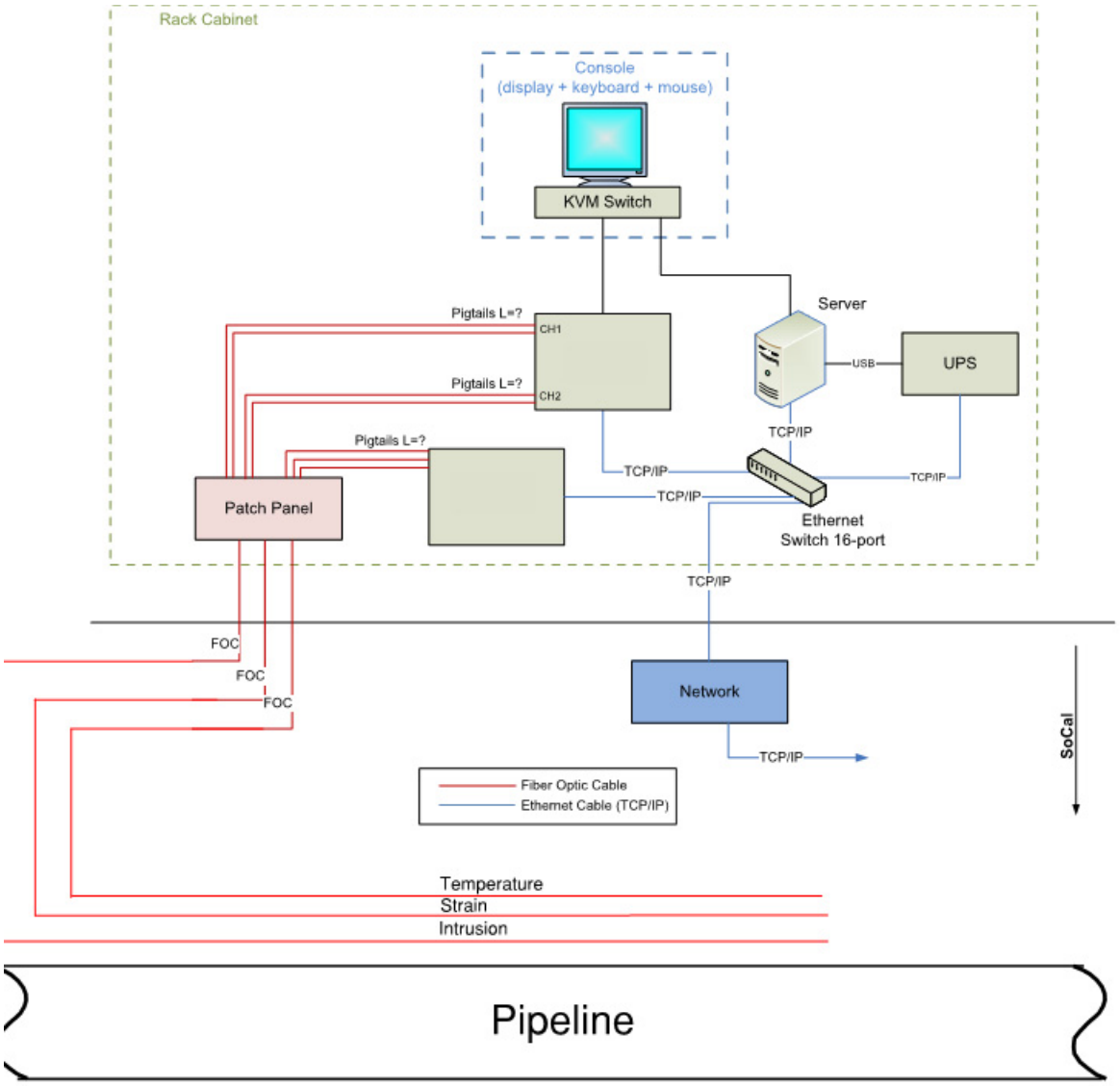
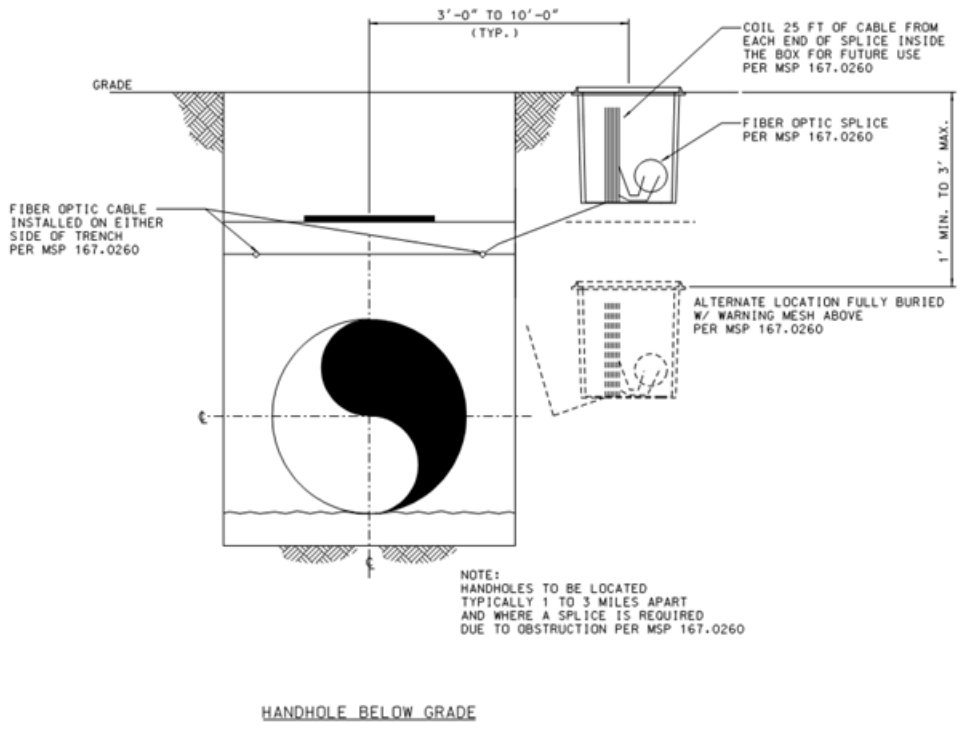


**FIGURE MAB-5**

**Illustration of Buried Fiber-Optic Cable and Transmission Pipeline**



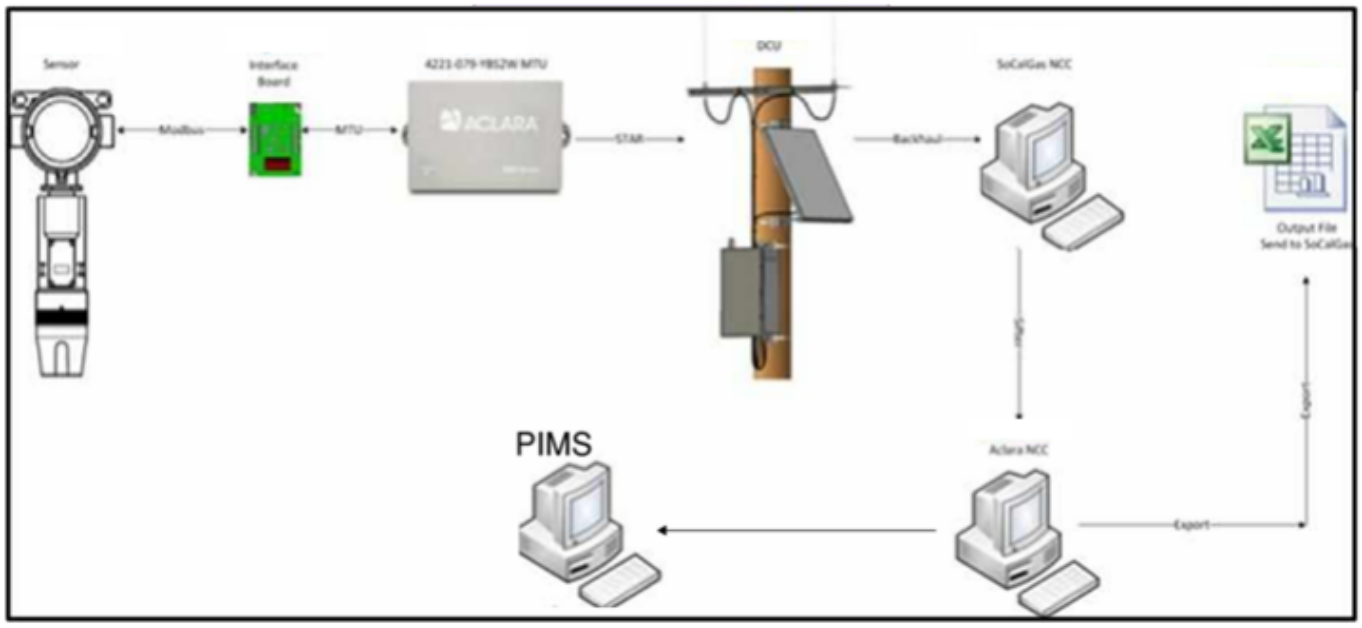

The methane monitoring project entails SoCalGas and SDG&E installing 2,100 methane monitoring sensors along their pipeline routes where their high-pressure pipelines 12" and greater in diameter are located in close vicinity to facilities that are high-density in occupancy, pose evacuation logistical challenges or have special implications to commerce, such as bridges and transportation centers. These sensors will be fitted with an advance meter (AM) radio-compatible module to allow for gas-in-air concentration information from the sensors to be recorded in the modules as average minimum and maximum hourly reads. If any measured value (updated every 1-5 minutes) registers a gas-in-air concentration above preset levels programmed in the AM recording module, there will be an immediate unscheduled alarm signal which is sent through the AM radio system and forwarded to the PIMS, where the alarm will be displayed for operator review, acknowledgement and action, if necessary. SoCalGas and SDG&E have been following (and assisting to drive) technology advancements in the methane monitoring sensor arena and already have tested methane monitoring sensing devices which range from 3 ppm to 500 ppm. Such devices have been successfully coupled with our AM radio systems. It is contemplated that most sensors installed as part of this capital project will be point

sensors capable of registration down to +/- 400 ppm (about 1% of the lower explosive limit of natural gas in air concentrations, and 1/5$^{th}$ to 1/20$^{th}$ of the typical human olfactory detection range). There may be some special areas (fault lines, etc.) which will be equipped with more expensive methane monitoring sensors capable of 3-5 ppm registration above background concentration of 2-3 ppm. These devices are currently deployed in our operations for early warning leak detection. SoCalGas and SDG&E have tested at least 10 different sensor technologies and work in this regard is ongoing.

Figure MAB-6 provides an overview of how the field mounted methane monitoring sensors will send data through the Advanced Metering system and to the PIMS work station for operator decision-making and dispatch of personnel, if warranted.

**FIGURE MAB- 6**

**Illustration of Methane Monitoring Sensors, Communication Device and PIMS**




**2. Forecast Method**

The forecast method for both methane monitoring sensors and fiber-optic cabling aspects developed for these projects is zero-based. The costs that were estimated for this project were based on current labor rates and general historical costs of installing comparable equipment. In addition to the costing methods above, the information attained during pilot-test installations was also used to develop these estimates. Capital Workpapers Exhibit SCG-08 presents methane monitoring sensor cost and technical information while Appendix B in Workpaper Group 343

provides supplemental methane monitoring sensor and program information. Forecasted costs include the methane monitoring sensors and ancillary equipment to power, mount and protect equipment.

### 3. Cost Drivers

The underlying cost drivers for this capital project are based on the costs of equipment, current labor rates, and contracting costs. Additional cost and technical information on the proposed systems are included in my Workpapers Exhibit SCG-08, Workpaper Group 343, Appendix B.

## V. CONCLUSION

SoCalGas' ability to meet its obligation to provide natural gas service in accordance with its tariff provisions and customer expectations is highly dependent on the reliable and safe operation of its natural gas system. The O&M and capital forecasts provided herein include four technology-based projects that are intended to modernize SoCalGas' transmission and distribution system and provide continued safe and reliable service while mitigating risk. As such, SoCalGas requests the Commission adopt its Major Projects and Construction Test Year 2019 O&M forecast of $3,971,000 and its associated capital forecast for 2017, 2018, and 2019 of $1,200,000, $8,969,000, and $37,714,000, respectively.

This forecast reflects SoCalGas' commitment to sustaining safe and reliable service to our customers through the incorporation of technology-based infrastructure while also striving to control project costs without compromising safety or regulatory compliance.

This concludes my prepared direct testimony.

## VI. WITNESS QUALIFICATIONS

My name is Michael A. Bermel. My business address is 555 West Fifth Street, Los Angeles, California, 90013. My current position is Director of Major Projects and Construction under the Gas Engineering and Major Projects organization at the Southern California Gas Company (SoCalGas). The Major Projects and Construction organization provides non-shared O&M services to the Southern California Gas Company and supports capital projects for both SoCalGas and SDG&E. I joined SoCalGas in 1981 and have been in my current position since January 2017. Prior to that, I was the Manager of the Measurement, Regulation and Control Organization in Gas Engineering for nearly 20 years. I have a Bachelor of Science Degree in Mechanical Engineering from California State University, Long Beach and am a Registered Professional Mechanical Engineer in the state of California.

I have previously testified before the Commission.

**SCG 2019 GRC Testimony Revision Log – December 2017**

| Exhibit | Witness | Page | Line | Revision Detail |
|---|---|---|---|---|
| *SCG-08* | *Mike Bermel* | *MAB-25* | *FN* | *Changed footnote 4: "A recent reevaluation of this activity suggests slight differences in the estimate. This will be corrected at the next opportunity" to "Supplemental Workpapers (Exhibit SCG-08-CWP, Workpaper Group 003430) supporting the detailed forecast of PIMS may reflect slightly different costs due to rounding."* |
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