Company: San Diego Gas & Electric Company (U 902 M)
Proceeding: 2019 General Rate Case
Application: A.17-10-007
Exhibit: SDG&E-07-R

REVISED

SDG&E

JOINT TESTIMONY OF MICHAEL A. BERMEL AND BETH MUSICH

(GAS TRANSMISSION CAPITAL)

DECEMBER 2017

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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SUMMARY

GAS TRANSMISSION (In 2016 $)				
	2016 Adjusted-Recorded (000s)	Estimated 2017 (000s)	Estimated 2018 (000s)	Estimated 2019 (000s)
TOTAL CAPITAL	**16,656**	**10,698**	**10,398**	**10,248**

Summary of Requests

Gas Transmission is responsible for many key activities and programs that support the ongoing vitality of San Diego Gas & Electric Company (SDG&E or Company) transmission pipeline operations and help SDG&E achieve the overarching objective to provide safe and reliable natural gas services at a reasonable cost. Gas Transmission provides the capital investments that support the safety and reliability of the transmission system. These activities are described in this testimony under the following categories:

- New Transmission Pipeline;
- Transmission Pipeline Replacements;
- Transmission Pipeline Relocations;
- Compressor Stations;
- Cathodic Protection; and
- Measurement and Regulation Station.

In preparing our Test Year (TY) 2019 forecast for this testimony, we reviewed historical spending levels and developed an assessment of future requirements. Because of the mature nature of the activities that we are sponsoring, most of our forecast relies upon a five-year average and, where necessary, a base-year cost was applied.

In total, SDG&E requests the Commission to adopt TY 2019 Gas Transmission capital expenditures of $10,698,000, $10,398,000, and $10,248,000 for 2017, 2018, and 2019, respectively.

REVISED SDG&E DIRECT TESTIMONY OF MICHAEL A. BERMEL AND BETH MUSICH (GAS TRANSMISSION)

I. INTRODUCTION

A. Summary of Gas Transmission Capital Costs and Activities

Our testimony supports the TY 2019 forecasts for capital costs for the forecast years 2017, 2018, and 2019 associated with the Gas Transmission area for SDG&E. Table JGT-1 summarizes our sponsored costs. All costs in this testimony are presented in 2016 dollars unless otherwise noted. In addition to this testimony, also refer to our workpapers, Exhibit SDG&E-07-CWP, for additional information on the activities described herein.

TABLE JGT-1
San Diego Gas & Electric Company
TY 2019 Summary of Total Capital Costs

GAS TRANSMISSION (In 2016 $)				
	2016 Adjusted-Recorded (000s)	Estimated 2017 (000s)	Estimated 2018 (000s)	Estimated 2019 (000s)
TOTAL CAPITAL	**16,656**	**10,698**	**10,398**	**10,248**

The capital investments described in greater detail herein support the safety and reliability of the natural gas transmission system while maintaining compliance with applicable regulatory and environmental requirements.

B. Purpose of Joint Testimony

The purpose of the joint testimony of Michael A. Bermel and Beth Musich is to support the request for Gas Transmission capital projects that are required for the safe and reliable operation of the SDG&E Gas Transmission system. These projects are both gas transmission pipeline projects as well as gas compressor related projects.

The SDG&E natural gas system is comprised of transmission lines, compressor stations and distribution lines. Our joint testimony will focus on the transmission function which

includes the operation of one compressor station (Moreno). SDG&E operates approximately 175 miles of natural gas transmission pipelines.[1]

SDG&E receives gas from Southern California Gas Company (SoCalGas) at the San Diego/Riverside County border at Rainbow, California and through various points of a pipeline that runs along the Orange County and San Diego County coastline. SDG&E may also receive gas through an interconnection point at Otay Mesa with the Transportadora de Gas Natural pipeline in Mexico.

Gas Transmission and Gas Major Projects are the two SoCalGas/SDG&E organizations responsible for a collection of key base-business projects and activities that support the ongoing reliability of SDG&E's natural gas transmission operations. They share a common goal of achieving operational excellence while providing safe and reliable natural gas service at a reasonable cost.

The SoCalGas/SDG&E Gas Major Projects organization, currently led by Mr. Bermel, was formed in 2013 to closely organize and oversee dedicated fiscal and operational management of large capital investments. Gas Major Projects provides consultation and analysis regarding cost estimates, permit requirements, scheduling and execution of major gas infrastructure facilities projects necessary for the continued safe and reliable transmission of natural gas throughout the service territory.

Ms. Musich, currently the Director of Gas Transmission, will testify to the purpose and need for each of these specific base-business projects and routine activities, and Mr. Bermel will sponsor the projected scope, schedule and estimated cost for these base-business projects and routine activities.

C. Summary of Costs Related to Fueling Our Future

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) initiative in May 2016 to identify and implement efficient operations improvements (Please see Ex. SCG/SDG&E-03 (Snyder and Clark). One such efficiency identified is to decommission the

[1] SDG&E's Distribution and Transmission operating units collectively operates 234 miles of pipeline defined as "transmission" under 49 CFR 192.3. Of the 234 Department of Transportation transmission miles, Gas Transmission operates approximately 175 miles of high pressure pipeline.

Rainbow Compressor Station, saving ongoing O&M expenses. Table JGT-2 provides a summary of the FoF cost efficiencies described in our testimony.

TABLE JGT-2
San Diego Gas & Electric Company
Summary of FoF Related Costs

GAS TRANSMISSION (In 2016 $)			
FoF-Implementation	**Estimated 2017 (000s)**	**Estimated 2018 (000s)**	**Estimated 2019 (000s)**
M04350.000 MP COMP STA	**450**	**150**	**0**
Total	**450**	**150**	**0**

D. Summary of Safety and Risk-Related Costs

SDG&E's foundational safety-first culture focuses on public, customer, and employee safety, with this commitment embedded in every aspect of our work. Our safety culture efforts include developing a trained workforce, operating and maintaining the natural gas infrastructure, and providing safe and reliable natural gas service.

The safety culture at SDG&E includes operating the gas system in a safe and reliable manner, complying with legal and regulatory requirements, and providing customers with safe and reliable natural gas service at a reasonable cost. The Gas Transmission function works toward achieving that desired safety culture by integrating its efforts into the corporate risk management and budgeting process, both at an enterprise level and through the TIMP program,[2] addressing the need for a qualified workforce through knowledge transfer; and operating and maintaining a safe and reliable transmission system.

SDG&E's safety culture includes standardizing policies and standards; complying with applicable laws, regulations, and internal policies; building and operating a system that supports the safe and reliable delivery of gas; communicating with stakeholders; and using data and data analysis to help make informed corporate decisions.

More specifically, Gas Transmission and Gas Major Projects support SDG&E's safety culture and its objective of a safe and reliable system through their continued support of the Public Awareness program. Gas Major Projects is an internal organization to help SDG&E

[2] Exhibit SDG&E-11, Maria Martinez.

remain prudent and fiscally astute in managing large capital investments. Gas Major Projects provides analysis and consultation regarding cost estimates, permit requirements, and scheduling of major gas infrastructure facilities projects necessary for the continued safe and reliable distribution and transmission of natural gas throughout the service territory.

Finally, Gas Transmission utilizes data and data analysis to evaluate the gas system to recommend capital expenditures associated with system improvements. These improvements are driven by the objective to operate a safe and reliable gas system. This data analysis process requires Asset Management, Data Management and Document Management systems to capture asset health and life cycle data which can then be used to predict the likelihood of an asset failure and the consequence of a failure. The analysis results in the identification of asset risks and the design and implementation of mitigation efforts.

An effective safety culture requires developing and maintaining a qualified workforce. Knowledge management consists of driving a culture of ongoing transference of historical operational knowledge. Gas Transmission works with Human Resources to develop a strategy to embed knowledge transfer into the organization. This strategy identifies the critical skills that should be transitioned to new employees prior to the departure of critical staff and aids in the mitigation of risk associated with not having qualified resources.

SDG&E places priority on maintaining compliance and managing risks, as evidenced by the effort and activity expended to identify and mitigate risks. Compliance with laws and regulations is also inherently tied to safety. Therefore, certain costs supported in our testimony are driven by activities described in SoCalGas and SDG&E's November 30, 2016 Risk Assessment Mitigation Phase (RAMP) Report.[3] The RAMP Report presented an assessment of the key safety risks of SDG&E and proposed plans for mitigating those risks. As discussed in the Risk Management & Policy testimony of Diana Day (Exhibit SCG/SDG&E-02), the costs of risk-mitigation projects and programs were translated from that RAMP Report into the individual witness areas.[4]

In the course of preparing our GRC forecasts, we continued to evaluate the scope, schedule, resource requirements and synergies of RAMP-related projects and programs.

[3] 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/SDG&E-02 (Diana Day) for more details regarding the utilities' RAMP Report.

[4] Direct Testimony of Diana Day, Ex. SCG/SDG&E-02.

Therefore, the final representation of RAMP costs may differ from the ranges shown in the original RAMP Report.

Table JGT-3 provides a summary of the RAMP-related costs supported in our testimony by RAMP risk. Additional detail on RAMP-related activities and costs are provided in Sections II and III of our testimony.

TABLE JGT-3
San Diego Gas & Electric Company
Summary of RAMP

GAS TRANSMISSION (In 2016 $)			
RAMP Risk Chapter	**2017 Estimated RAMP Total (000s)**	**2018 Estimated RAMP Total (000s)**	**2019 Estimated RAMP Total (000s)**
SDG&E-10 Catastrophic Damage Involving High-Pressure Gas Pipeline Failure	1,689	1,689	1,689
Total Capital	**1,689**	**1,689**	**1,689**

E. Organization of Testimony

Our joint testimony sponsors the TY 2019 General Rate Case capital forecasts for years 2017, 2018, and 2019 for Gas Transmission. We also briefly discuss our ongoing efforts regarding the Moreno Compressor Replacement project, and provide an estimated forecast of project costs while recognizing that the project will be executed and in-service during the post-test years 2020 and 2021. Additional detail for this project is provided in our workpapers SDG&E-07-CWP at Workpaper Group M04350, Supplemental Workpaper SDG&E-07-CWP-SUP-01. In addition to this testimony, please refer to the capital workpapers of Beth Musich and Michael A. Bermel, Ex. SDG&E-07-CWP, for additional information on the projects and activities described herein.

Our testimony is organized as follows:

- Introduction;
- Risk Assessment Mitigation Phase and Safety Culture;
- Capital Requests for the Following Activities;
  - New Construction Pipeline;
  - Pipeline Replacements;
  - Pipeline Relocations;

- Compressor Station Capital Improvements;
- Cathodic Protection;
- Measurement and Regulation Station; and

- Conclusion.

II. RISK ASSESSMENT MITIGATION PHASE AND SAFETY CULTURE

A. Risk Assessment Mitigation Phase

Part of the capital forecast sponsored in this joint testimony is linked to mitigating a safety risk that has been identified in SDG&E's RAMP Report. Thus, this testimony will address RAMP elements summarized in the following table:

TABLE JGT-4
San Diego Gas & Electric Company
RAMP Risk and Description

RAMP Risk	Description
SDG&E-10 Catastrophic Damage Involving High-Pressure Pipeline Failure	This risk relates to the potential public safety and property impacts that may result from the failure of high-pressure pipelines (greater than 60 psi).

This chapter proposes risk mitigation of the above identified RAMP risk, specifically, Chapter SDG&E-10, titled "Catastrophic Damage Involving a High-Pressure Gas Pipeline Failure." For this safety element, SDG&E will de-rate, pressure test, or replace sections of pipeline, where necessary, due to the class location changes based on a growth in population near our facilities, i.e., the re-classification of a pipeline segment from non-High Consequence Area to High Consequence Area (HCA) due to changes in population density in the vicinity of that pipeline segment. This joint testimony discusses those pipelines that will undergo replacement as a result of a change in class location.[5] Our testimony will also address the RAMP safety element for cathodic protection, which is another element of Chapter SDG&E-10 of the RAMP

[5] Testing and de-rating of pipeline necessitated by class location changes is discussed in the testimony of Ms. Musich, Ex. SDG&E-06.

Report. These activities include remediation of cathodic protection areas that are out-of-tolerance and preventative maintenance. This type of compliance-based work will enhance the public and employee safety. The general treatment of RAMP forecasting is described in the testimony by Ms. Day (Ex. SCG/SDG&E-02).

As illustrated in Table JGT-5, some of our requested funds are linked to mitigating safety risks that have been identified in Chapter SDG&E-10 of the RAMP report.

TABLE JGT-5
San Diego Gas & Electric Company
Summary of RAMP-Related Capital Costs

GAS TRANSMISSION (In 2016 $)			
SDG&E-10 Catastrophic Damage Involving High-Pressure Gas Pipeline Failure	**2017 Estimated RAMP Total (000s)**	**2018 Estimated RAMP Total (000s)**	**2019 Estimated RAMP Total (000s)**
004160.001, RAMP - BASE GT CATHODIC PROTECTION	184	184	184
M04120.001, RAMP Pipeline Replacement	1,505	1,505	1,505
Total	**1,689**	**1,689**	**1,689**

As shown in the tables, the RAMP risk mitigation efforts are associated with specific programs or projects. For each of these mitigation efforts, an evaluation was conducted to determine the portion, if any, that already was included in our historical activities. A determination was also made of the portion that may be accommodated within a particular forecasting methodology such as averaging or trending, as well as the portion, if any, that represents a true incremental cost increase or decrease from that forecasting methodology.

While the starting point for consideration of the risk mitigation effort and cost was the RAMP report, our evaluation of those efforts continued through the preparation of this GRC request. Therefore, the costs of risk mitigation sponsored in our testimony may differ from those first identified in the RAMP report.

Additional details on project-specific RAMP attributes are further described in Section III as well as in the workpapers found in Ex. SDG&E-07-CWP.

B. Safety Culture

In addition to the focus on safety through our RAMP efforts, SDG&E maintains a foundational safety-first culture that focuses on public, customer, and employee safety. Our

commitment to safety is embedded in every aspect of our work including our efforts to develop a trained workforce, our efforts in operating and maintaining the natural gas infrastructure, and by providing safe and reliable natural gas service while maintaining compliance with applicable regulatory and environmental regulations.

A common theme throughout our testimony is the foundational aspect of safety in every decision we make. This is exhibited through recurring training, safety awareness postings at SDG&E facilities, Job Site Safety Plans at active construction sites, and Injury Illness and Prevention Plans, among other activities. Through reliance on the professional judgment of experienced, skilled, and well-trained employees, SDG&E utilizes capital in a manner that supports our foundational safety culture and is consistent with local, state, and federal codes and regulations.

III. CAPITAL

The primary objective of SDG&E's capital investments is to provide safe and reliable delivery of natural gas to customers at a reasonable cost. This commitment requires that SDG&E invest in its infrastructure and support services to mitigate risks associated with the safety of the public and employees, service reliability, and gas system integrity. The main factors that drive the purpose and need for Gas Transmission capital projects relate to load growth in particular geographic areas, the increasing average age of natural gas transportation infrastructure, and/or the relocation of existing facilities due to the leading cause of pipeline damage: third-party activities. In other cases, a factor driving capital projects is the trend toward automation and remote operating capabilities, as is simple obsolescence of installed equipment that no longer may be supported by the manufacturer, and the increasing scarcity of replacement parts. By using technology and the professional judgment of experienced, skilled, and well-trained employees, SDG&E utilizes capital in a responsible manner, consistent with local, state, and federal codes and regulations, and promotes safety and reliability of the natural gas transmission system.

In preparing our TY 2019 forecast for this testimony, we reviewed historical spending levels and developed an assessment of future requirements. Most of our forecasting relies upon a five-year average; where that was not used, the base-year method was adopted.

To continue to provide safe and reliable service while mitigating associated risks, Gas Transmission requests the Commission to adopt its forecast for capital expenditures of $10,698,000, $10,398,000, and $10,248,000 in each of the years 2017, 2018, and 2019, respectively. Table JGT-6 summarizes the total capital costs for the forecast years.

TABLE JGT-6
San Diego Gas& Electric Company
Gas Transmission Capital Expenditures Summary of Costs

GAS TRANSMISSION (In 2016 $)				
Categories of Management	**2016 Adjusted-Recorded**	**Estimated 2017 (000s)**	**Estimated 2018 (000s)**	**Estimated 2019 (000s)**
NEW CONSTRUCTION PIPELINE	3,900	3,901	3,901	3,901
PIPELINE REPLACEMENT	1,688	1,505	1,505	1,505
PIPELINE RELOCATION	0	2	2	2
COMPRESSOR STATION	9,897	4,415	4,115	3,965
CATHODIC PROTECTION	489	184	184	184
MEASUREMENT & REGULATION STATIONS	682	691	691	691
Total	**16,656**	**10,698**	**10,398**	**10,248**

A. New Construction Pipeline (Budget Code 4X1)

New Construction Pipeline is required to provide the backbone and local natural gas transmission system with additional resiliency, capacity, and reliability in order to serve new or increased loads or to provide natural gas supply reinforcement to an existing area. This forecast captures costs associated with multiple smaller new construction pipeline capital projects that are expected to be completed during the forecast period.

TABLE JGT-7
San Diego Gas & Electric Company
New Construction Pipeline Capital Expenditures Summary

GAS TRANSMISSION (In 2016 $)				
NEW CONSTRUCTION PIPELINE	**2016 Adjusted-Recorded**	**Estimated 2017(000s)**	**Estimated 2018(000s)**	**Estimated 2019(000s)**
NEW CONSTRUCTION PIPELINE	3,900	3,901	3,901	3,901
Total	**3,900**	**3,901**	**3,901**	**3,901**

1. Forecast Methodology for New Construction Pipeline

The New Construction Pipeline projects were forecasted using the base-year capital cost forecast methodology. This forecast methodology incorporates actual recorded capital costs from the current base year (2016). We could not reasonably employ a five-year average methodology for these new pipeline installations because the recorded history varied considerably.

2. Cost Drivers for New Construction Pipeline

Cost estimates are influenced by efforts to enhance engineering and design work to bolster the integrity of newly-commissioned pipeline. New and replacement pipelines are built to be piggable in conformance with Department of Transportation guidelines. Underlying cost drivers considered when forecasting new pipeline construction projects include the pipe size and pressure, the location of the project (specifically, whether the project is located in an urban setting versus a rural setting), the availability of qualified contractors, and permitting conditions which often include the review and approval by local governments.

B. Pipeline Replacements (Budget Code 4X2)

Occasionally natural gas transmission pipelines need to be replaced due to the condition of the pipeline or hazardous conditions affecting the existing pipeline location. Some pipeline sections need to be replaced due to erosion from agricultural activities or storm water runoff; more often, however, replacements are required due to a class location change, which is the re-classification of a pipeline segment from non-High Consequence Area to High Consequence Area (HCA) due to changes in population density in the vicinity of that pipeline segment.

Pipeline Replacements due to changes in class location are included in SDG&E's RAMP Chapter 10.

The forecast provided herein is for several small projects and includes the costs to plan, design and engineer, permit, procure material, construct, commission, and mitigate most environmental impacts that may arise.

TABLE JGT-8
San Diego Gas & Electric Company
Pipeline Replacements Capital Expenditures Summary

GAS TRANSMISSION (In 2016 $)				
GAS TRANSMISSION REPLACEMENT	**2016 Adjusted-Recorded**	**Estimated 2017 (000s)**	**Estimated 2018 (000s)**	**Estimated 2019 (000s)**
PIPELINE REPLACEMENT	1,688	1,505	1,505	1,505
Total	**1,688**	**1,505**	**1,505**	**1,505**

1. Forecast Methodology for Pipeline Replacement Projects

The forecast method is based on the five-year average. SDG&E expects to see replacement work consistent with the five-year average; thus, this methodology best reflects anticipated needs.

2. Cost Drivers for Pipeline Replacement Projects

The underlying cost drivers for these capital projects relate to pipe size and pressure, the class location of the project, lead time, availability of qualified contractors, and workload. Pipe size and pressure is a function of required volume. Pipe grade and wall thickness is a function of design related to the operating pressure, and class location is a function of the population density where the pipeline is placed in service. Lead time is often a function of customer notice to SDG&E or the demands of local governments and agencies. Lastly, supply and demand forces will affect pricing: the pool of qualified contractors in Southern California is limited and these contractors perform work for customers other than SDG&E. Thus, construction and installation bids vary with the contractors' workload and associated projected lead times.

C. Pipeline Relocation – Franchise (Budget Code 4X4)

The modification or relocation of natural gas transmission pipeline located within existing franchise is occasionally required to accommodate planned private property

development, municipal public works and street improvement projects, right-of-way agreements, or other contract or franchise agreements.[6]

Included in this forecast is the cost associated with unplanned natural gas transmission pipeline relocations that may occur within the forecasted period.

TABLE JGT-9
San Diego Gas & Electric Company
Pipeline Relocations – Franchise, Capital Expenditures Summary

GAS TRANSMISSION RELOCATION	2016 Adjusted-Recorded	Estimated 2017 (000s)	Estimated 2018 (000s)	Estimated 2019 (000s)
PIPELINE RELOCATION - FRANCHISE	0	2	2	2
Total	**0**	**2**	**2**	**2**

1. Forecast Methodology for Pipeline Relocations – Franchise

The cost to execute these projects follows the five-year average. Projects with the franchise/private sector are not always known during the annual budgeting process. SDG&E expects to see franchise locations work consistent with the five-year average; thus, this methodology best reflects anticipated needs.

2. Cost Drivers for Pipeline Relocation – Franchise

The underlying cost drivers for these capital projects relate to pipe size and pressure, the class location of the project, lead time, availability of qualified contractors, and workload. Pipe size and pressure is a function of required volume. Pipe grade and wall thickness is a function of design related to the operating pressure, and class location is a function of the population density where the pipeline is placed in service. Lead time is often a function of customer notice to SDG&E or the demands of local governments and agencies. Lastly, supply and demand forces will affect pricing: the pool of qualified contractors in Southern California is limited and these contractors perform work for customers other than SDG&E. Thus, construction and installation bids vary with the contractors' workload and associated projected lead times.

[6] Budget Code 4X3, Pipeline Relocations – Freeway, did not have historical costs from 2012-2016 and thus was not included in any forecasted amount for this rate case.

D. Compressor Stations (Budget Code 4X5)

The nature of compressor station operation requires consistent maintenance and replacement of key engine components and controls equipment to maintain the reliability and safety of the facility, especially as this equipment continues to age. To keep operating costs down, SDG&E relies on automated data gathering systems to monitor performance data such as flows, pressures, and temperatures. The upgrade and replacement of outdated control technology is critical to enable the station to operate at its highest efficiency and facilitate the execution of proper testing and diagnostics when the engine units are down. Existing compressor station equipment has a finite life requiring regular replacement and/or upgrade, as recommended by manufacturers or as required by operating experience, to maintain reliability and transportation ability for the Southern California market. The capital forecasts identified in Table JGT-10 follow the five-year average capital costs on existing compressor assets. As described below, this does not include forecasted capital associated with the Moreno Compressor Replacement project.

TABLE JGT-10
San Diego Gas & Electric Company
Gas Transmission Compressor Stations, Capital Expenditures Summary

GAS TRANSMISSION COMPRESSOR STATION	2016 Adjusted-Recorded	Estimated 2017 (000s)	Estimated 2018 (000s)	Estimated 2019 (000s)
COMPRESSOR STATION	9,897	4,415	4,115	3,965
Total	**9,897**	**4,415**	**4,115**	**3,965**

1. Moreno Compressor Replacement Project

While it does not appear in SDG&E's TY 2019 General Rate Case, the Moreno Compressor Replacement project is ongoing and capital expenditures for this project will be presented in a future General Rate Case. As presented in the Direct Testimony of Raymond Stanford in SDG&E's TY 2016 General Rate Case, the Company indicated its concern with the "end-of-useful life issues with the equipment" and that it would "develop[ing] a strategy for the next General Rate Case to deal with the aging compressor station infrastructure."[7]

[7] *See* A.14-11-003 (SDG&E-06); SDG&E 2016 General Rate Case, Direct Testimony of Raymond Stanford (Exhibit SDG&E-29/SDG&E-06) at RKS 23, lines 8-10.

Mr. Stanford's testimony indicated that these "strategies will include actions and engineering solutions to help SDG&E minimize its carbon footprint, improve engine efficiency and meet the ever-increasing emission-reduction requirements." [8]

In response, SDG&E engaged a third-party engineering firm to conduct the Front End Engineering Design (FEED) for the compressor replacement at Moreno Compressor Station. The strategy developed through the extensive FEED process provides the engineering solutions to minimize carbon footprint, improve engine efficiency, meet the ever-more-stringent emission reduction requirements and enables SDG&E to meet the current and future obligation to serve customers reliably.

Due to the expected completion date extending into 2021 or 2022, there are no explicit cost representations or revenue requirements for this project in this General Rate Case. Additional details on the forecasted capital expenditures for the Moreno Compressor Replacement project, including post-test year investment, are provided in our workpapers SDG&E-07-CWP at Workpaper Group M04350, Supplemental Workpaper SDG&E-07-CWP-SUP-01.

2. Rainbow Compressor Decommissioning

An area of efficiency identified in SDG&E's Fueling our Future initiative is to decommission aging infrastructure at Rainbow Compressor Station. Rainbow Compressor Station is no longer required to operate so long as the Moreno Compressor Station is reliably available to provide natural gas compression. The decommissioning of the aging Rainbow Compressor Station will save ongoing O&M and capital. The capital implementation will be completed in 2018 with ongoing O&M savings thereafter, as described by Ms. Musich (Ex. SCG/SDG&E-06). The associated capital work increased the five-year forecast of Compressor Station activities by $450,000 in 2017 and $150,000 in 2018.

[8] *Id*. at RKS 23, lines 10-12.

3. Other Capital Improvements at Compressor Stations

The other capital improvements include routine, bulk work that is forecasted based on the five-year average cost. These projects typically are small in nature and are not individually identified but are treated as 'routine' or 'blanket' budget work.

a. Forecast Methodology for Compressor Capital Improvements

The forecast method used for Compressor Stations is the average of the most recent five years' recorded costs. The small capital increase in 2017 and 2018 is due to the Fueling our Future measure as described in the Rainbow Decommissioning discussion above.

b. Cost Drivers for Compressor Capital Improvements

The underlying cost drivers for Compressor Station capital projects relate to the highly specialized nature of very high pressure, high volume engine-driven compressors, the increasing average age of compressor equipment, and the limited number of qualified contractors that specialize in industrial engines and compressor equipment.

E. Cathodic Protection (Budget Code 4X6)

Cathodic protection equipment is used to preserve the integrity of natural gas transmission pipelines, steel mains and services lines, and buried appurtenances by protecting them from external corrosion. Cathodic protection of these facilities is mandated by federal and state pipeline safety regulations and is included in SDG&E's Risk Assessment Mitigation Phase Chapter 10 addressing Transmission Cathodic Protection.

Typical expenditures include the installation or replacement of surface anode beds, deep well anodes and rectifier systems, and cathodic protection stations. Cathodic protection projects may also include the installation of new remote satellite communication technology. This technology allows for increased efficiency in the operation and monitoring of remote cathodic protection systems.

TABLE JGT-11
San Diego Gas & Electric Company
Cathodic Protection Capital Expenditures Summary

CATHODIC PROTECTION	2016 Adjusted-Recorded	Estimated 2017(000s)	Estimated 2018(000s)	Estimated 2019(000s)
GAS TRANSMISSION CATHODIC PROTECTION	489	184	184	184
Total	**489**	**184**	**184**	**184**

1. Forecast Methodology for Cathodic Protection

The forecast method used for Cathodic Protection is the average of the most recent five years' recorded cost. Specific projects have not been planned and SDG&E expects to perform Cathodic Protection replacement and installations of deep-well anode beds and rectifiers consistent with the five-year average.

2. Cost Drivers for Cathodic Protection

The underlying cost drivers for this capital forecast relate to the specialized nature of cathodic protection capital projects, especially with the installation of deep-well anode beds. There are very few qualified contractors, which has a direct bearing on costs.

F. Meter and Regulator Stations (Budget Code 4X8)

The installation and rebuilding of large meter set assemblies for transmission-served customers and pressure limiting stations that reside on the gas transmission system is included in this category. Meter and regulator stations require replacement for three principal reasons: aging, change in use patterns and/or population encroachment, and enhancement of the transmission system to address gas quality and capacity issues. This includes periodic replacement of local field measurement and control equipment directly linked with Gas Operations Supervisor Control and Data Acquisition system (SCADA) via remote communications. It includes gas meters installed to help manage gas flows and quality on the transmission system, and to provide operating information to gas operations control personnel remotely managing the gas delivery system. Also included in this category are regulating stations used to control and limit gas pressure and the flow of gas within the gas transmission system.

As with all capital projects, in identifying and prioritizing meter and regulator station equipment for replacement, SDG&E considers the associated safety and reliability risks as well as the benefits of replacement over other alternatives, if any. The installation of this equipment is associated with the safe and reliable local operation of SDG&E pipelines in conformance with regulatory requirements for the limiting of pipeline and vessel operating pressures. All pipelines must be operated within their maximum allowable operating pressure parameters, and this equipment, whether for newly installed pipelines or existing pipelines, maintains the operating integrity of the transmission system. The projects in this activity category include a number of small, like-kind projects that are needed to safely and reliably operate SDG&E's natural gas transmission system, but do not individually meet the capital costs threshold to require individual workpapers.

TABLE JGT-12
San Diego Gas & Electric Company
Meter and Regulator Stations Capital Expenditures Summary

MEASUREMENT & REGULATION STATIONS	2016 Adjusted-Reocrded (000s)	Estimated 2017 (000s)	Estimated 2018 (000s)	Estimated 2019 (000s)
GAS TRANSMISSION MEASUREMENT & REGULATION STATIONS	683	485	485	485
Total Capital	**683**	**485**	**485**	**485**

1. Forecast Methodology for Meter and Regulator Station Projects

The forecast method used for Meter and Regulator Stations is the average of the most recent five years' recorded cost. Specific projects have not been planned and SDG&E expects to perform Meter and Regulator Station projects consistent with the five-year average.

2. Cost Drivers for Meter and Regulator Station Projects

The underlying cost drivers for this activity relate to the highly specialized nature of the equipment used to regulate transmission pressures and measure flows. An additional driver of

costs is the trend toward requiring higher levels of measurement accuracy and additional remote-control through Supervisor Control and Data Acquisition and telemetry.

IV. CONCLUSION

SDG&E's 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 operation of natural gas transmission pipeline, compressor stations, valves, and related natural gas transmission appurtenances. In order to continue to provide safe and reliable service, SDG&E must continue to invest in its infrastructure pursuant to applicable regulatory requirements.

SDG&E requests the Commission to adopt its forecasted capital expenditures for years 2017, 2018 and 2019 of $10,698,000, $10,398,000, $10,248,000, respectively. This forecast reflects SDG&E's commitment toward sustaining safe and reliable service to our customers while also striving to control project costs without compromising safety or regulatory compliance.

This concludes our prepared direct testimony.

V. WITNESS QUALIFICATIONS

Beth Musich has been the Director of Gas Transmission for SoCalGas and SDG&E since January 2015. She holds a Bachelor of Science degree in Mechanical Engineering from Colorado School of Mines in Golden, Colorado. She was originally employed by Pacific Enterprises in 1993 and moved to SoCalGas in 1996 and since then has held positions of increasing responsibilities in the Marketing, Regulatory and Operations departments. Ms. Musich has testified before the Commission previously on behalf of Southern California Gas Company and San Diego Gas & Electric.

Michael A. Bermel currently is Director of Major Projects and Construction under the Gas Engineering and Major Projects organization at SoCalGas. The Major Projects and Construction organization provides non-shared O&M services to SoCalGas and supports capital projects for both SoCalGas and SDG&E. He joined SoCalGas in 1981 and has been in his current position since January 2017. Prior to that he was the Manager of the Measurement, Regulation and Control Organization in Gas Engineering for nearly 20 years. He has a Bachelor of Science Degree in Mechanical Engineering from California State University, Long Beach and is a Registered Professional Mechanical Engineer in the state of California. Mr. Bermel has testified before the Commission previously.

SDG&E 2019 GRC Testimony Revision Log –December 2017

Exhibit	Witness	Page	Line	Revision Detail
SDGE-07	Beth Musich & Mike Bermel	JGT-17	16-17	Changed table to reflect corrected historical average