Company: San Diego Gas & Electric Company (U902M)
Proceeding: 2016 General Rate Case
Application: A.14-11-XXX
Exhibit: SDG&E-04

SDG&E

DIRECT TESTIMONY OF FRANK AYALA

(GAS DISTRIBUTION)

November 2014

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

SDGE
A Sempra Energy utility®

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GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars	**2013 Adjusted-Recorded**	**TY 2016 Estimated**	**Change**
Total Non-Shared	18,383	21,692	3,309
Total Shared Services (Incurred)	0	0	0
Total O&M	**18,383**	**21,692**	**3,309**

GAS DISTRIBUTION				
Shown in Thousands of 2013 Dollars	**2013 Adjusted-Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
Total CAPITAL	**25,502**	**32,378**	**37,363**	**40,971**

In total, San Diego Gas & Electric Company (SDG&E or the Company) requests the Commission adopt its Test Year 2016 (TY2016) forecast of $21,692,000 for Gas Distribution Operations and Maintenance (O&M) expenses. SDG&E also requests the Commission adopt its forecast for capital expenditures in 2014, 2015, and 2016 of $32,378,000, $37,363,000, and $40,971,000, respectively. SDG&E's O&M and Capital requests are reasonable and fully justified in that:

- The activities are consistent with operational laws, codes and standards established by local, state, and federal agencies;
- The activities are necessary to maintain the delivery of safe and reliable service to SDG&E's customers;
- The activities respond to operations, maintenance, and construction needs associated with projected customer and system growth and demands of cities, counties, and state agencies under the Company's franchise agreements;
- The activities are necessary to maintain a qualified workforce;
- The activities support new field technologies; and
- The activities support SDG&E's commitment to mitigate risks associated with hazards to public and employee safety, infrastructure integrity and system reliability.

The activities described in my testimony below are consistent with operational laws, codes and standards established by local, state, and federal agencies. This includes inspection and maintenance activities required under General Order 112-E, and by reference, 49 CFR 192.

This work is necessary to safeguard the long term integrity of the system and includes compliance activities, such as facility inspections, cathodic protection maintenance, pipeline facility maintenance, and monitoring odorant levels. SDG&E anticipates this work to continue to increase as it manages an aging infrastructure and responds to evolving regulatory and legislatives requirements. Furthermore, the work described in my testimony complies with the requirements of Public Utilities Code Sections 961 and 963, which were enacted by Senate Bill (SB) 705 in 2011. These code sections direct "each gas corporation to develop and implement a plan for the safe and reliable operation of its gas pipeline facilities."[1]

The activities in my testimony are necessary to maintain the delivery of safe and reliable service to SDG&E's customers. SDG&E prioritizes work activities to comply with laws and regulations and provide system integrity and reliability, in accordance with our commitment to safety:

> San Diego Gas and Electric's longstanding commitment to safety focuses on three primary areas – employee safety, customer safety and public safety. This safety focus is embedded in what we do and is the foundation for who we are – from initial employee training, to the installation, operation and maintenance of our utility infrastructure, and to our commitment to provide safe and reliable service to our customers.[2]

Following are some of the key work categories included in my request in support of this commitment to safety:

- Leak Repairs - Main and service line leak evaluation and repair work is completed to address public safety, infrastructure condition, and material failure.
- Locate and Mark – Gas facilities are located and marked to avoid third party damage that could create a safety hazard and/or disrupt gas service. Through the completion of this work, SDG&E provides important information to excavators to safeguard those working around gas facilities and protect the integrity of the pipeline system.
- Leak Survey – SDG&E proactively surveys its gas distribution system for leakage at frequencies determined based on the pipe material involved, the operating pressure, cathodic protection type, and the proximity of the pipe to various population densities.

[1] Cal. Pub. Util. Code §§ 963(b)(3) and 961(b)(1).
[2] SDG&E's Natural Gas System Operator Safety Plan, Attachment A-Executive Summary, filed June 29, 2012 in Rulemaking (R.) 11-02-019.

- System renewal - This includes activities to replace and/or abandon pipeline facilities, such as mains, services, regulating and metering equipment, cathodic protection systems, and electronic equipment, that have reached the end of their useful lives and present risk of failure.
- High Pressure Pipeline Documentation – SDG&E is committed to maintaining verifiable, traceable, and complete records for all high pressure pipeline facilities. Additional recordkeeping and quality control processes for high pressure pipeline installations, including limited access material storage areas and an electronic pipeline documentation management system, have been established.

The activities in my testimony respond to operations, maintenance, and construction needs associated with projected customer and system growth and demands of cities, counties, and state agencies under the Company's franchise agreements. These activities support the Company's obligation to serve customers and mitigate system reliability risks. Some examples of this work include:

- New Business - System expansion is performed primarily to provide service to new customers and includes the installation of new pipeline infrastructure. These costs are incurred as a result of SDG&E's obligation to serve a growing customer base. SDG&E anticipates this work will increase as the number of new meter set installations increase with improving economic conditions.
- Capacity Improvements – Projects to improve system capacity, such as adding new pipelines or replacing existing infrastructure with larger systems, are completed to accommodate customer and/or load growth.
- Freeway and Franchise – This work is driven by external state, county and municipal agencies who submit requests for SDG&E to relocate pipe and associated facilities that would, in its current location, interfere with planned construction or reconstruction of freeways, highways, streets, sewers, storm drains or water lines. SDG&E anticipates that these agencies will continue to initiate infrastructure improvements at the level seen in recent years.

The activities in my testimony are necessary to maintain a qualified workforce. Safety is rooted in all phases of gas distribution training. As discussed further in my testimony below,

SDG&E is taking proactive action to address employee training, qualification and work quality. An integral component of overall workforce proficiency is the Operator Qualification program. Operator Qualification compliance is closely monitored and employees are trained, either formally or informally, whenever significant changes occur in a work task or as required per SDG&E's Gas Standards, per CPUC General Order 112-E, and per 49 CFR Part 192. SDG&E forecasts several incremental increases to support this important safety aspect including a significantly expanded Operator Qualification program, incremental employee training, additional instructors, an expanded field quality assurance program and improvements to training facilities.

The activities in my testimony support new technologies. As SDG&E continues to implement new technologies to improve operations, the organization must embrace the change. Support systems must be in place to monitor the integration of these tools within the field and overall management practices. SDG&E forecasts incremental increases associated with review of procedures and changes to processes; development of reports and tools to monitor the effectiveness of operations; identification and implementation of business improvements; and ongoing training of employees on system enhancements.

In preparing projections of TY2016 requirements, SDG&E Gas Distribution Operations reviewed historical spending levels and developed an assessment of future requirements, with consideration of the underlying cost drivers. Depending on future expectations, a primary forecast methodology was selected based on one of the following approaches: historical averages; simple linear trending of historical data; the base year (2013) adjusted recorded spending; estimated future growth; project-specific development based on identified projects or materials; or a combination of project-specific justification as well as analysis of historic spending. In addition, work requirements that are incremental to levels of historical spending and necessary to maintain the safe and reliable operations of the distribution system and supporting work processes were identified. An analytical calculation was then performed to determine the funding requirement of these new or more-extensive work elements. The overall result is a forecast that has its foundation based on the historical representation, to which are added prudent incremental expense requirements.

SDG&E DIRECT TESTIMONY OF FRANK AYALA
GAS DISTRIBUTION

I. INTRODUCTION

A. Summary of Costs

I sponsor the TY2016 forecasts for O&M costs for non-shared and capital costs for the forecast years 2014, 2015, and 2016, associated with the Gas Distribution area for SDG&E. There are no shared service activities included in this Testimony.

In total, SDG&E requests the Commission adopt its TY2016 forecast of $21,692,000 for non-shared service Gas Distribution O&M expenses. SDG&E further requests the Commission adopt its forecast of capital expenditures for 2014, 2015, and 2016 of $32,378,000, $37,363,000 and $40,971,000, respectively. Table FBA-01 summarizes my sponsored costs.

Table FBA-01
San Diego Gas & Electric Company
Test Year 2016 Summary of Total Costs

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
Total Non-Shared	18,383	21,692	3,309
Total Shared Services (Incurred)	0	0	0
Total O&M	**18,383**	**21,692**	**3,309**

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
Total CAPITAL	**32,378**	**37,363**	**40,971**

The purpose of this testimony is to demonstrate the reasonableness of SDG&E's Gas Distribution capital expenditure and expense forecasts required to operate and maintain the gas distribution system and construct new gas distribution facilities, as necessary. SDG&E's fundamental philosophy is to achieve operational excellence while providing safe and reliable delivery of natural gas to customers at reasonable cost. This commitment requires that SDG&E continues to invest in its employees, pipeline assets and support services to mitigate risks

associated with the safety of the public and employees; system reliability; and infrastructure integrity. Specifically, the activities discussed herein are:

- Required to maintain safety;
- Reflective of local, state, and federal regulatory and legislative requirements;
- Necessary to maintain overall system integrity and reliability;
- Responsive to customer growth;
- Compliant with franchise obligations; and
- Required to maintain a qualified workforce.

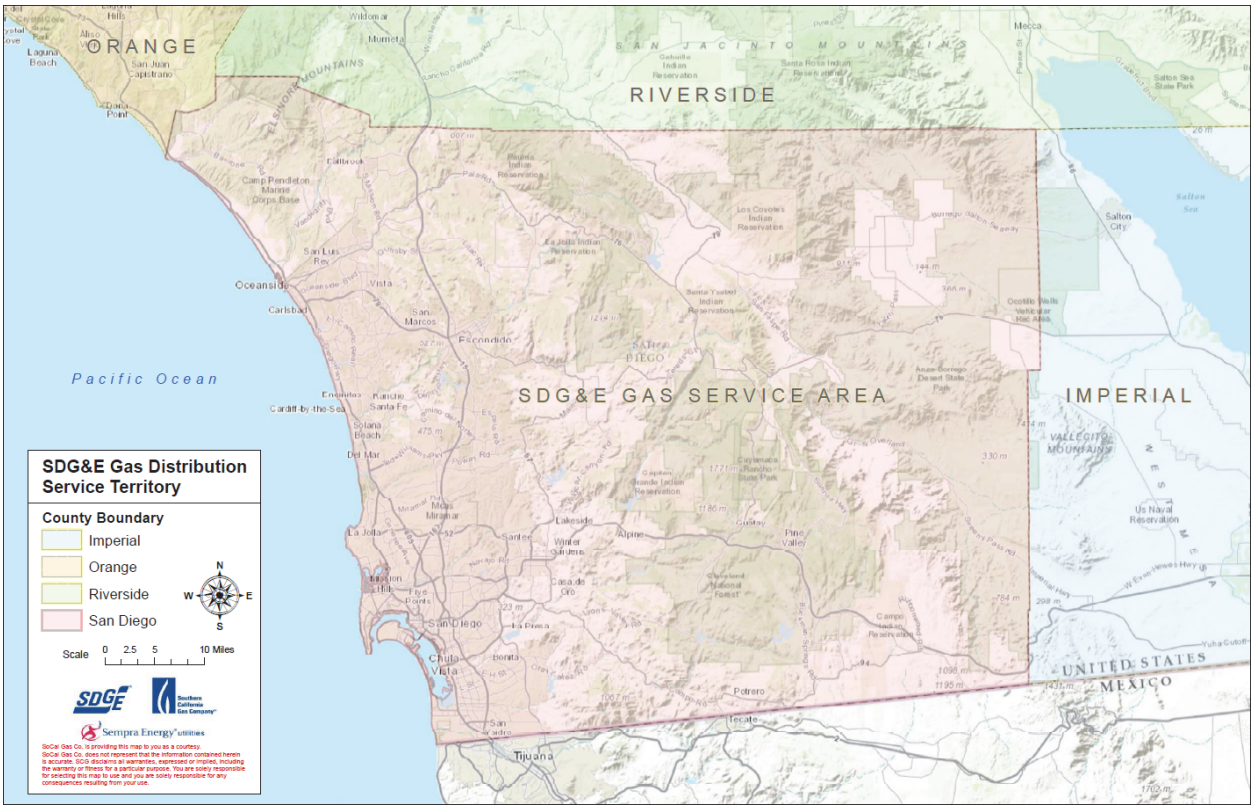
This testimony discusses non-shared expenses in support of O&M functions for gas distribution mains and services, measurement and regulator stations, customer meters, regulators and electronic equipment and includes the associated engineering, supervision, and technical support. The capital expenditures presented herein are in support of the installation, replacement and relocation of the distribution pipeline infrastructure. All costs in this testimony are shown in 2013 dollars, unless otherwise noted.

In addition to this testimony, please also refer to my workpapers, Ex. SDG&E-04-WP (for O&M) and SDG&E-04-CWP (for capital), for additional information about the activities described here.

B. Summary of Activities

SDG&E's gas distribution system consists of a network of approximately 14,600 miles of interconnected gas mains, services and associated pipeline facilities. These mains and services, constructed of both steel and plastic materials in varying diameters, are located in most streets within SDG&E's service territory. The primary function of this distribution pipeline network is to deliver natural gas from SDG&E's transmission system to approximately 865,300 customer meters in an area of over 1,400 square miles, stretching from Orange County in the north to the Mexico border in the south, as depicted in Figure FBA-01, below.

Figure FBA-01
San Diego Gas & Electric Company
SDG&E Gas Distribution Service Territory



SDG&E maintains a network of 8,000 miles of gas mains, which are operated at either high-pressure (over 60 pounds per square inch (psi)) or medium-pressure (60 psi and below). This system contains numerous valves capable of isolating the total system into smaller areas for operation, construction, and emergency purposes. SDG&E operates regulator stations located throughout the system to maintain gas pressure, regulate the distribution system and provide adequate capacity to meet customer needs. The final component of this network is composed of gas service lines that connect the high- and medium-pressure mains to each customer meter set assembly (MSA) and "house pipeline." SDG&E maintains approximately 6,600 miles of service lines.

SDG&E routinely performs work to maintain the daily operation of the system, connect new customers, maintain the necessary capacity to serve all customers, replace damaged or deteriorating facilities, and relocate facilities to meet customer and governmental agency needs.

This work is accomplished by a well-trained and skilled workforce. This workforce ranges from front-line construction crews to technical planners and engineers. There are approximately 340 distribution employees located at five operating bases and one technical office throughout SDG&E's service territory. These employees are responsible for maintaining safe and reliable operation of the gas distribution system.

C. The Gas Distribution Organization Supports SDG&E's Operational, Safety and Reliability Goals

My cost forecasts support the Company's goals of achieving operational excellence while providing safe and reliable delivery of natural gas to customers at reasonable cost, while mitigating risks associated with hazards to public and employee safety, infrastructure integrity and system reliability.

As noted above, SDG&E operates approximately 14,600 miles of pipeline mains and services to meet the natural gas energy needs of customers. SDG&E is committed to continued long-term investment in its pipeline infrastructure to maintain the integrity of its distribution system and comply with applicable local, state, and federal laws and regulations. The Company actively evaluates the condition of its pipeline system through maintenance and operations activities, and replaces pipeline segments to preserve the safe and reliable system customers expect. SDG&E and its customers cannot afford to wait for a major incident to occur to respond with necessary replacement activities. With the requested level of funding, and by continuing to identify ways to improve gas distribution system installation, operation, and maintenance activities, SDG&E will have the necessary resources to manage these business and operational challenges, and will continue to provide safe and reliable natural gas service at reasonable cost.

SDG&E faces a number of challenges affecting both the physical operation of the pipeline system and cost management aspects of its business that contribute to the forecasts presented in this testimony. These challenges include:

Trained and Qualified Workforce

Safety is rooted in all phases of gas distribution training. Maintaining a skilled, qualified and dedicated workforce is critical to SDG&E's continued success. It is through the efforts of these employees that SDG&E is able to continue to deliver reliable service to customers and maintain the integrity of its pipeline infrastructure at reasonable cost. SDG&E is experiencing increased pressures associated with maintaining a highly trained and qualified workforce. These include:

- Increased regulatory pressure for stricter compliance assurance. To address this pressure, SDG&E will add personnel to expand its quality assurance program, field instructors to assist with on-the-job training and compliance administrative advisors to more closely review employees' work.
- Increased turnover in workforce, primarily due to retirements and employee movement as a result of promotions and transfers, continues to pose challenges to SDG&E, particularly in the areas of knowledge transfer, skills development, and overall proficiency of the replacement workforce. Gas Distribution is taking appropriate measures to maintain its highly skilled workforce, recognizing that safety and system reliability cannot be sacrificed during times of employee transition. As new and less experienced employees step in to replace highly-skilled employees, SDG&E is conscientiously training and mentoring them, giving them on-the-job experiences, and providing greater levels of supervision and quality assurance to instill a continued focus on proficiency and safety.
- Furthermore, SDG&E is expanding its Operator Qualification program to better align with recommendations by CPUC auditors and industry leading practices, as well as comply with SB 705, which requires pipeline operators to establish a safety plan that is "consistent with leading practices in the gas industry and with federal pipeline safety statutes."[3] This includes adding new qualification elements, developing qualification materials, establishing an electronic record-keeping process, and conducting training to qualify impacted employees.

Aging Infrastructure

SDG&E has a long history of delivering safe and reliable natural gas service, notwithstanding the fact that a significant portion of the pipeline infrastructure has been in service for over 50 years. Good maintenance practices have allowed SDG&E to safely and reliably operate these pipeline facilities for this extended period of time, but this cannot continue forever. As the Company's pipeline infrastructure continues to age, it requires higher levels of maintenance, which results in higher costs.

[3] Cal. Pub Util. Code § 961(c).

In addition to aging pipelines, SDG&E is also addressing the aging of other pipeline infrastructure, such as measurement and regulation equipment, electronic systems, and cathodic protection system components, such as anode beds and rectifiers. All components of the gas distribution system have a finite useful life that must be observed, and repairs must be anticipated in order to avoid service interruptions, non-compliance situations, or adverse safety conditions.

System Expansion

SDG&E's pipeline system continues to expand as new construction adds to the customer base and the need for pipeline infrastructure. During the economic downturn period from 2009 to 2012, SDG&E averaged 4,397 new customers per year requesting to be connected to the system. Such requests increased to roughly 5,133 in 2013, and are forecasted to further increase to 12,376 in TY2016. New facilities add to the inventory of assets that require operations and maintenance attention. Pipelines must be leak surveyed to monitor asset condition and any deficiencies found must be corrected. Facilities need to be located and marked to minimize potential damage from outside sources. System valves, meters, and regulators must be inspected, operated, and maintained. Finally, any necessary repairs must be made in a timely manner. Collectively, these actions are necessary to maintain a safe and reliable distribution system for a growing base of customers.

Customer and Load Demands

As a public utility, SDG&E has an obligation to provide customers within its service territory natural gas service in accordance with tariff rules. As the customer base grows and expands, new demands are placed on existing infrastructure. For example, customer load growth creates the need for facility upgrades, increasing customer density requires the relocation of existing infrastructure, and general business improvements require the Company to protect its infrastructure from potential damage due to third-party construction. Field experience indicates that more favorable economic conditions lead to increases in various work requirements. SDG&E anticipates that as the economy continues to recover,[4] this will impact activities related to customer and load demands.

[4] IHS Global Insight is used as a directional indicator for general economic conditions and potential economic growth.

State and Municipal Agency Construction Requirements

The construction, operation, and maintenance of SDG&E's vast pipeline system require interaction and compliance with numerous agencies. These agencies continue to impose new and often more stringent administrative, planning, and field construction operating conditions that can result in increased cost pressures to maintain the gas distribution system. This includes increased costs associated with permits, traffic control plans, paving repair requirements, and restricted work hours. SDG&E works diligently with these agencies to find solutions that are in the best interest of customers and agencies. Nevertheless, these rules often result in cost increases.

Integration of Technology

SDG&E is implementing technology-based systems and processes that will change the way personnel plan, monitor and document construction projects. The forthcoming process changes will require training of employees on the new technology tools and business process changes. Once this technology is implemented, the organization must embrace the change. Support systems must be in place to facilitate the integration of these tools within field and management practices. This will require technical support for impacted employees, updating of field procedures and training materials and support to implement process changes. Reports and tools will need to be established to gather, consolidate, and summarize newly-available data to monitor the effectiveness of operations and identify future business improvements.

D. Gas Distribution Safety and Risk Considerations

SDG&E's Risk Management and Policy witness, Diana Day (Exhibit SDG&E-02), and Gas Operations Risk Policy witness, Douglas Schneider (Exhibit SDG&E-03), describe how safety and security risks are assessed and factored into SDG&E's investment decisions. See Exhibits SDG&E-02 (Diana Day) and SDG&E-03 (Doug Schneider / David Geier). My testimony includes costs to mitigate Gas Distribution risks associated mainly with public and employee safety, system reliability, regulatory and legislative compliance, and pipeline system integrity.

O&M and capital work elements are managed daily, based on a variety of risk factors and work drivers, such as federal and state regulatory requirements, customer and pipeline growth expectations, franchise obligations, permitting requirements and conditions found during inspections. These work elements are prioritized based first, on immediate safety and

compliance considerations, and then, work is actively prioritized considering factors such as regulatory compliance deadlines, customer scheduling requirements, and overall infrastructure condition.

Generally, examples of O&M activities categorized as safety and compliance include: leak survey and patrols; leak repairs; locate and mark, stand-by observations and depth checks; inspections of valves, bridges, spans, and measurement and regulation facilities; and maintenance of cathodic protection systems. These elements are generally prioritized ahead of work that can be safely managed to occur within a more flexible schedule. For example, in the case of Code 1 (hazardous) leaks, [5] Gas Distribution crews are required to take immediate and continuous action until the hazard has been mitigated. Activities with more flexible schedules that are also required to safeguard the integrity of the pipeline system include: main and service alterations; compliance work self-audits; and employee training. Additionally, there are a number of support activities necessary to complete work. These include: dispatch and work scheduling; supervision; technical support; tools; technology systems; and quality assurance.

In addition to O&M activities, to maintain safe and reliable service, SDG&E makes a variety of capital improvements, including pressure betterment projects to improve areas of low pressure, pipeline renewals to replace deteriorated pipelines or obsolete equipment, installations and replacements of cathodic protection systems and the purchase of electronic monitoring devices for pressure tracking. The specific factors considered in the prioritization process of capital work may vary depending on the type of project. For example, new business installations and freeway and franchise relocations are coordinated to address customer scheduling requirements. Pressure betterment requirements are assessed in concert with engineering analysis of system design, and in compliance with reliability guidelines. The prioritization of pipeline projects (*e.g.,* mains, services, cathodic protection, valves, and regulator station replacements) is driven by a review of maintenance activities and findings, results of field workforce inspections, and records of condition. These inspection evaluation elements are some of the factors used to determine replacement needs.

Other factors considered for the replacement of assets include the age of the infrastructure, general equipment reliability, and/or design obsolescence. In addition, during the

[5] Leaks are prioritized for ongoing field response based on a number of factors including location, concentration of gas, and hazard to the public and property.

evaluation of distribution main and service replacements, field and technical staff consider the results from a computational model used to help assess the risk-rank of pipeline segments.

Since capital work is dynamic, ongoing assessment of system operations is necessary. For example, construction timelines can be affected by permitting, material availability, customer schedules, other construction-related factors and/or additional work requirements that may arise throughout the year in response to maintenance, inspection and other routine activities. These real-time operational situations are considered when evaluating and subsequently addressing daily distribution pipeline safety and reliability risks.

E. Support To and From Other Witnesses

My testimony also references the testimony or workpapers of several other witnesses, either in support of their testimony or as referential support for mine. Those witnesses are Douglas Schneider (Exhibit SDG&E-03, Gas Operations Risk Policy), Maria Martinez (Exhibit SDG&E-07, Pipeline Integrity for Transmission and Distribution), Jonathan Woldemariam (Exhibit SDG&E-10, Electric Distribution O&M), Sara Franke (Exhibit SDG&E-13, Customer Services Field), Carmen Herrera (Exhibit SDG&E-16, Fleet Services), and Rose-Marie Payan (Exhibit SDG&E-32, Customers).

1. Small Meter and Regulator Purchases

I sponsor the capital costs associated with the purchase of both Gas Distribution and Customer Services meters and regulators. The labor costs associated with the replacement of small meters and regulators, typically at residential and small commercial sites, can be found in the prepared direct testimony of Sara Franke, Exhibit SDG&E-13. Additional information about these capital purchases may be found in Section III.D (Meter and Regulator Materials) of my testimony.

2. New Meter Set Forecast

Gas Distribution's capital New Business construction costs and the related meter and regulator unit purchases are driven by the number of new customer meter set installations. Details on customer meter set forecast methodology can be found in the workpapers of SDG&E Customers witness Rose Marie Payan, Exhibit SDG&E-32-WP. Additional information about the forecasts of new meter sets may be found in Section III.B (New Business) of my testimony.

3. Incremental Vehicles

In order to perform the incremental work associated with the forecasted level of O&M and capital activities, SDG&E is adding vehicles, as required, within applicable workgroups and capital budget codes. The costs associated with these vehicles may be found in the prepared direct testimony of Carmen Herrera, Exhibit SDG&E-16.

4. Distribution Integrity Management Program Activity Moving to Gas Distribution Operations

One activity currently funded through 2015 by the Distribution Integrity Management Program (DIMP) is Quality Assurance. This activity is part of a pilot program that has proven to be successful and will become part of routine Gas Distribution operations by 2016. This activity is discussed in Section II.D (Operations Management and Training) of my testimony.

5. Electric Support

Labor and non-labor expenses are incurred by Gas Distribution crews that have been specially trained to provide traffic control support services for Electric Distribution crews performing Corrective Maintenance Program inspections. Additional information about the electric Corrective Maintenance Program may be found in the prepared direct testimony of Jonathan Woldemariam (Exhibit SDG&E-10, Electric Distribution O&M).

6. Economic Growth

Gas Distribution relied on non-farm employment growth, as reported by IHS Global Insight, as a directional indicator for general economic conditions and potential economic growth. This IHS Global Insight employment forecast is shown in the workpapers of SDG&E Customers witness Rose Marie Payan, Exhibit SDG&E-32-WP. Additional information may be found in Section II.C (Asset Management – Pipeline O&M Planning) and Section III.B (New Business) of my testimony.

The following sections of my testimony focus on each O&M and capital funding request. Each presentation addresses the activities completed, historical spending, projected business challenges, and justification for the request. Section II is dedicated to O&M Non-Shared Services; and Section III to capital expenditures. Concluding remarks are presented in Section IV, followed by my Witness Qualifications in Section V.

In addition to this testimony, please also refer to my workpapers, Exhibit SDG&E-04-WP (O&M) and Exhibit SDG&E-04-CWP (capital) for information about the activities described herein.

II. NON-SHARED OPERATIONS AND MAINTENANCE COSTS

A. Introduction

Operations and maintenance activities are routinely performed on over 14,600 miles of gas distribution main and service pipeline and associated facilities in response to federal and state regulatory agency codes and standards (*e.g.*, Transportation of Natural and Other Gas By Pipeline: Minimum Federal Safety Standards, 49 CFR 192; California Government Code section 4216, *et seq*.; General Order 112-E; and General Order 58-A), customer and pipeline growth expectations, franchise obligations, and to sustain safe and reliable operation of the pipeline system. This work includes leakage surveys, leak repairs, maintenance on mains and services, application of corrosion control measures, valve maintenance, regulator station maintenance, monitoring meter accuracy, gas odorant monitoring, and locating and marking buried pipes to avoid damage caused from excavation by others. In addition, there is a variety of supporting work necessary to complete this field operations and maintenance work. Examples of support work include: maintaining pipeline maps and related gas system attribute information, administering and implementing city permitting and traffic control requirements, and maintaining engineering models of system flows and pressures. Investment in these activities supports SDG&E's commitment to mitigate risks associated with hazards to public and employee safety, infrastructure integrity and system reliability.

The level of funding requested in this testimony will allow compliance with pipeline safety regulations and the continued safe and reliable operation of SDG&E's gas distribution pipeline system. Furthermore, this request supports compliance with the requirement in SB 705 that "each gas corporation place safety of the public and gas corporation employees as the top priority."[6]

Spending to comply with federal DIMP regulations governing distribution pipeline integrity is addressed in the prepared direct testimony of Maria Martinez, Exhibit SDG&E-07.

Unique cost centers are used to record the cost of O&M activities performed within Gas Distribution operations. Collectively, approximately 40 cost centers are used in recording the costs shown within this testimony. To facilitate an analysis of historical spending and to complete an evaluation of projected expenditures, cost centers are aggregated into "workgroups"

[6] Cal. Pub. Util. Code § 963(b)(3).

representing similar functions and/or having similar cost drivers. These 40 cost centers are thus aggregated into 12 workgroups which will be reviewed within this testimony under the following categories:

- Field Operations and Maintenance;
- Asset Management – Pipeline O&M Planning; and
- Operations Management and Training.

In preparing projections of the TY2016 requirements, SDG&E Gas Distribution reviewed historical spending levels, including units of work, and developed an assessment of future requirements and associated risks. This analysis entailed a review of the historical 2009 through 2013 spending and consideration of the underlying cost drivers. Depending on future expectations for the underlying cost drivers, a primary forecast methodology was selected. Selected methods include forecasting based on historical averages, simple linear trending of historical data, and 2013 adjusted recorded base year spending. In addition, work requirements that are incremental to levels of historical spending and necessary to maintain the safe and reliable operation of the distribution system and supporting work processes were identified. An analytical calculation was then performed to determine the funding requirement of these new or more-extensive work elements. The overall result is a forecast that has its foundation based on the historical representation, to which are added incremental expense requirements.

In summary, Gas Distribution requests the Commission adopt a TY2016 forecast of O&M expenses for non-shared services of $21,692,000, as summarized in Table FBA-02 below. This is an increase of $3,309,000 over the 2013 adjusted recorded base. This increase is driven by system expansion, infrastructure renewal, field technical skills and training, improved documentation and control of pipeline materials, and the integration of new technology.

Table FBA-02
San Diego Gas & Electric Company
Non-Shared O&M Summary of Costs

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
Categories of Management	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
B. Field Operations & Maintenance	14,521	16,440	1,919
C. Asset Management	1,624	1,848	224
D. Operations Management & Training	2,238	3,404	1,166
Total	**18,383**	**21,692**	**3,309**

The Commission should find this forecast reasonable and fully justified in that: 1) the activities support continued delivery of safe and reliable service; 2) activities are consistent with local, state, and federal regulations; 3) activities respond to operations, maintenance, and construction needs associated with projected growth and demands of city, county and state agencies; 4) the forecast amounts are reasonable in light of historical spending and anticipated work increases, and 5) the activities support SDG&E's commitment to mitigate risks associated with hazards to public and employee safety, infrastructure integrity and system reliability.

B. Field Operations and Maintenance

Table FBA-03
San Diego Gas & Electric Company
Field Operations and Maintenance

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
1. Other Services	86	88	2
2. Leak Survey	1,213	1,250	37
3. Locate & Mark	2,538	2,505	-33
4. Main Maintenance	1,977	1,977	0
5. Service Maintenance	1,183	1,244	61
6. Tools Fittings & Materials	328	467	139
7. Electric Support	606	737	131
8. Supervision & Training	2,498	2,841	343
9. Measurement & Regulation	3,058	3,464	406
10. Cathodic Protection	1,034	1,867	833
Total	**14,521**	**16,440**	**1,919**

Included in this section of my testimony are activities and associated O&M expenses to address the physical condition of the gas distribution system. As discussed above in Section I.B (Summary of Activities), Gas Distribution Operations conforms to a regional organization structure. Similar activities are completed out of five operating bases located throughout the 1,400 square-mile service territory. The activities completed at these operating bases form the essence of this category, Field Operations and Maintenance. They can be described as "preventative," "corrective," or "supportive" in nature. Preventative work is generally completed on a scheduled basis. It includes the activities and associated costs shown within the workgroups of Locate and Mark, Leak Survey, and Measurement and Regulation. Corrective work is generally reactive to a situation or facility condition. This would include the activities and associated costs shown in the workgroups of Cathodic Protection, Main Maintenance and Service Maintenance. Finally, supportive elements are necessary for completing work assignments and include activities and associated costs discussed in the Supervision and Training, Electric Support, Tools, Materials and Fittings, and Other Services workgroups.

1. Other Services

The Other Services workgroup consists of miscellaneous expenses associated with Gas Distribution field operations not captured in other major workgroups. Table FBA-04 below summarizes Gas Distribution O&M costs associated with Other Services activities.

Table FBA-04
San Diego Gas & Electric Company
Field O&M – Other Services

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
1. Other Services	86	88	2

a. Description of Costs and Underlying Activities

Other Services workgroup activities include leak investigations of customers' house lines, leak surveys of transmission mains, paving and street repair, and support of the installation of cathodic test stations for high pressure main evaluation.

b. Forecast Method

In developing this forecast, historical expenditures for 2009 through 2013 were evaluated. Because of the wide range of activities recorded in this workgroup, as well as the cost fluctuations from year to year, a five-year average was selected to forecast future costs. The selection of the five-year average methodology results in an increase of $2,000 from the 2013 adjusted recorded base in TY2016.

c. Cost Drivers

As indicated above, this group captures a wide array of activities. Therefore, the cost drivers are also diverse and have few, if any, common traits. Examples of cost drivers include:

- The number of leak investigation calls requiring customer houseline evaluation, which can be driven by unseasonable weather conditions or homeowner construction activity;
- Transmission main special leak surveys or patrols, which can be driven by regulatory requirement changes or Company policy changes; and
- General level of construction activity that requires paving and street repair, which is driven by changing economic or new business conditions.

2. Leak Survey

Recorded to the Leak Survey workgroup are the labor and non-labor expenses associated with federal pipeline safety regulation 49 CFR 192.481 (Atmospheric corrosion control: Monitoring) and 49 CFR 192.723 (Distribution systems: Leakage surveys), which direct SDG&E to survey the gas distribution system for leakage. Table FBA-05 below summarizes Gas Distribution O&M costs associated with Leak Survey activities.

Table FBA-05
San Diego Gas & Electric Company
Field O&M – Leak Survey

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
2. Leak Survey	1,213	1,250	37

a. Description of Costs and Underlying Activities

Leak surveys are performed at various time intervals depending on the pipe material involved, above- or below-grade location, the operating pressure, and the proximity of the facilities to various population densities. SDG&E's above-grade pipelines are monitored for atmospheric corrosion on a three-year survey interval. Below-grade pipelines are leak-surveyed at one-year or five-year intervals. Examples of pipelines that are surveyed annually include pipelines located in business districts. A business district is defined as a principal business area in a community where large numbers of people regularly congregate to engage in business activities such as: purchasing, sales, manufacturing of commodities, or public service establishments such as schools, churches, and hospitals. Five-year leak survey cycles are typically used for plastic and cathodically-protected steel mains and services installed in residential areas.

During a leak survey, the field employee patrols above the identified location of SDG&E's distribution subsurface main and service pipelines with a leak detector to identify, classify, and generate a repair work order for any leak indications found. Also included in this workgroup are expenses associated with right-of-way clearing in order to perform the leakage surveys. This activity supports SDG&E's commitment to mitigate risks associated with hazards to public and employee safety, infrastructure integrity and system reliability.

b. Forecast Method

The forecast method chosen for this cost category is a five-year average of expenses for the period 2009 through 2013. This method is appropriate because leak survey activity history varies slightly from year to year due to fluctuations in the number of leak investigation orders, number of leaks found, geographic area and population density of the five-year survey area, and special surveys including unstable earth areas, post-earthquake area surveys, and operations-driven surveys performed when there is an increase in pipeline maximum operating pressure (MOP). SDG&E is adding two incremental light duty vehicles in 2014 for two leak survey team members transitioning from teams of two, while on the job training, to patrolling on their own. The costs associated with these vehicles can be found in the prepared direct testimony of Ms. Carmen Herrera, Exhibit SDG&E-16.

This five-year average results in an increase of $37,000 from the 2013 adjusted recorded base in TY2016.

c. Cost Drivers

The cost drivers supporting this forecast are the compliance requirement for the three-year atmospheric corrosion monitoring survey, and the one-year and five-year frequency leak surveys, as well as special leak survey activities, and follow-up leak investigations. Follow-up leak investigation orders are issued to leak survey personnel by a service technician unable to locate the source of a possible customer reported leak. In order to close the leak investigation order leak survey personnel must survey all underground gas facilities within 150' feet of initial location where the leak or odor was reported.

3. Locate and Mark

Locate and Mark is the process mandated by 49 CFR 192.614 (Damage prevention program) and the California One Call Law (Government Code section 4216), where the owner of underground facilities, when notified by the Underground Service Alert One-Call Center of a planned excavation, must respond within two working days and mark the location of those underground facilities that are in conflict with the planned excavations. Table FBA-06 below summarizes Gas Distribution O&M costs associated with Locate and Mark activities.

Table FBA-06
San Diego Gas & Electric Company
Field O&M – Locate and Mark

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
3. Locate & Mark	2,538	2,505	-33

a. Description of Costs and Underlying Activities

To comply with the Locate and Mark regulatory and legal requirements cite above, employees use an electronic pipe-locating device to identify the location of SDG&E's underground pipelines and utilize substructure maps and service history records to aid in verifying the location of the gas lines.

Conducting stand-by observations of other entities excavating in close proximity to SDG&E pipelines is another important damage prevention activity included in this workgroup. Generally, this involves an employee inspecting construction job sites to confirm that excavators are aware of the location of critical SDG&E gas facilities. The State of California enacted regulations in 2007 that mandate a preconstruction meeting with excavators requesting Locate and Mark support and require continuous monitoring of all excavations within ten feet of high-pressure pipelines.[7]

b. Forecast Method

The forecast method chosen for this cost category is a five-year average for the period 2009 through 2013. This method is most appropriate because combined labor and non-labor historical expenses have remained consistent over time and are reasonably stable. Evaluation of Locate and Mark historical expenses indicates an upward trend in non–labor expenses, and a corresponding downward trend in labor expenses. This is primarily attributed to the increased use of contract Locate and Mark services, which are booked as non-labor expense and the corresponding decreased use of Company labor to provide the same Locate and Mark services. Selection of the five-year average methodology results in a decrease of $33,000 from the 2013 adjusted recorded base for TY2016.

[7] *See* Cal. Code Regs., Tit. 8, § 1541(b)(1)(B) (2007).

c. Cost Drivers

The cost drivers supporting this forecast are primarily driven by construction and infrastructure maintenance activities in the public and private sectors. Examples of these types of construction activities include private construction projects, such as commercial and industrial centers, strip malls, residential remodeling projects, and city projects such as street improvements and storm drain, water and sewer pipeline relocation work.

These cost drivers support the safety and reliability of SDG&E gas system. Properly locating and marking gas facilities, as well as performing stand-by observations, are activities completed to avert damage by third party excavators that can interrupt gas service and pose a risk to public and employee safety.

4. Main Maintenance

Recorded to this workgroup are the labor and non-labor costs associated with investigating and repairing leaks in distribution mains and moving, lowering, and raising short sections of gas distribution mains, vaults, and related structures. Table FBA-07 below summarizes Gas Distribution O&M costs associated with Main Maintenance activities.

Table FBA-07
San Diego Gas & Electric Company
Field O&M – Main Maintenance

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
4. Main Maintenance	1,977	1,977	0

a. Description of Costs and Underlying Activities

As required by General Order 112-E, SDG&E periodically surveys its entire pipeline system for leaks using specialized leak detection equipment. Information on all leaks identified must be recorded and classified, and hazardous leaks repaired promptly. SDG&E maintenance crews investigate these leak indications and make repairs, as needed. Completing leak repairs generally requires excavating in paved streets and landscaped areas to determine the exact location of the leak. This work often involves pavement cutting, trenching, and then repair of pipe facilities, followed by backfilling the excavation, compacting the soil, and making permanent repairs to pavement and landscaping as needed. Main leak evaluation and repair

work is generally completed to mitigate risks associated with hazards to public safety, and to address infrastructure condition, and material degradation.

In addition to leak repairs, improvements by municipalities and other outside agencies can trigger the requirement to perform maintenance on gas mains and related equipment. This includes street widening, sewer and water line maintenance or replacement, and street resurfacing. In the case of street resurfacing, SDG&E crews must locate buried gas facility vault lids that have been paved over, then uncover them or raise them so they are flush with the new street surface. Municipality and local/state agency improvements are normally a function of availability of local funding, often a sign of stronger economic conditions. The cost associated with main maintenance supports SDG&E's commitment to mitigate risks associated with hazards to public safety, infrastructure integrity and system reliability.

b. Forecast Method

Main maintenance activities and processes have changed in recent years. Changes include responding to increased traffic control and permitting requirements by municipalities. In addition a new Code 1 leak repair philosophy has been implemented. When a Code 1 leak is identified through routine leak survey work or leak investigation initiated by a customer odor complaint, the leak is attended and monitored by leak survey personnel until a gas construction crew arrives on site. Gas crews then work the Code 1 leak repair through completion, often resulting in overtime. To reflect the most current conditions for main maintenance, SDG&E's base forecast for this workgroup is the 2013 adjusted recorded level of spending. Added to this base expenditure level are incremental additions necessary to adequately fund the operation in TY2016. Below is an explanation of the incremental requirements. The net result of the selection of this methodology, including incremental additions, results in no increase from the 2013 adjusted recorded base for TY2016.

i. <u>After Hours Emergency Response</u>

After hours emergency response to address damage to Company facilities is performed by an on-call gas crew at each of the five operating districts. On-call gas crew members are contacted by dispatch. After receiving notification, and prior to responding to the incident, on-call gas crew members report to the operating district base to gather and pick up a gas crew vehicle. The majority of after-hours emergencies are in response to third-party damage on gas service piping. In order to expedite the response to these incidents, each of the five districts will

receive a take home vehicle for the on-call gas crew foreman. The vehicle will be of size that can be parked at an employee's residence and feature necessary tools and equipment to control the flow of gas from damaged service piping. This will enable the on-call gas crew to immediately report to the incident site and control the flow of gas from damaged Company facilities supporting SDG&E's ability to meet the requirement in SB 705 to "[p]rovide timely response to customer and employee reports of leaks and other hazardous conditions and emergency events."[8] The costs associated with the five incremental vehicles may be found in the direct testimony of Carmen Herrera, Exhibit SDG&E-16.

The projected cost to outfit the incremental vehicles with basic tools and equipment is an estimated one-time expense of $11,000 per vehicle for each of the five operating districts, for a total expense of $55,000 in the year 2014. The incremental increase over the base forecast for TY2016 associated with this upward pressure is $0 since this is a one-time only expense in the year 2014.

c. Cost Drivers

The work completed in this workgroup is driven by federal and state pipeline safety regulatory requirements and SDG&E's efforts to protect the integrity of the pipeline system through activities that extend its life. These activities support SDG&E's commitment to mitigate risks associated with hazards to public safety, infrastructure integrity and system reliability. As outlined above, a variety of factors influence the level of spending on main maintenance in a given year. These factors include:

- The number of leaks evaluated and repaired each year. This work is generally completed to address public safety, infrastructure condition, and material degradation. As discussed previously, leaks are found by employees conducting leak survey, and other field activities or by customers who call indicating a gas smell.
- The level of repairs associated with damages to pipeline facilities by third parties. This cost is driven by the number and severity of the damage. For example damage to a service line is less costly than damage to a high pressure line which may require multiple days of work and a large number of personnel to address. Damages are driven by the level of construction in the private and public sector, which is typically driven by economic conditions.

[8] Cal. Pub. Util. Code § 961(d)(6).

- The level of work completed by municipalities. Typical municipality projects include street resurfacing, widening or reconstruction; and sewer and water pipeline maintenance, replacement or new installations. Per applicable franchise agreements, SDG&E is required to complete associate maintenance, such as: raising or lowering valve casings and lids; altering the elevation of pipeline segments in their present locations; or relocating pipeline segments or related facilities completely. The impact to SDG&E can vary significantly, depending on the availability of municipality funds, which are typically driven by economic conditions. As economic conditions continue to improve, construction by municipal agencies is likely to increase.

5. Service Maintenance

Recorded to this workgroup are the labor and non-labor costs associated with investigating and repairing leaks in distribution services. Table FBA-08 below summarizes Gas Distribution O&M costs associated with Service Maintenance activities.

Table FBA-08
San Diego Gas & Electric Company
Field O&M – Service Maintenance

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
5. Service Maintenance	1,183	1,244	61

a. Description of Costs and Underlying Activities

Service maintenance work is generally corrective in nature and is required to keep the natural gas system operating safely and reliably. The work in this workgroup is designed to meet federal (49 CFR 192) and State (General Order 112-E) pipeline safety regulations, extend the life of the distribution service pipeline system, and mitigate risks associated with hazards to public safety. This includes excavating to determine the exact source of a leak, changing service valves, checking the condition of coating at the MSA, testing service pipe for leaks, inspecting and testing service pipe after repairs have been made, and installing, maintaining, and removing temporary feeds such as "by-passes" or temporary supply sources.

In addition, expenses associated with the repair of service risers—the portion of the pipeline segment located above ground just below the meter and connected to the service pipe—

are recorded to this service maintenance workgroup. Repairs to the riser are often required due to atmospheric corrosion of the piping system.

Service Maintenance includes costs for moving, lowering, and raising shorter sections of distribution services, vaults, and related structures. Changing the location of an existing service may be required due to alterations in buildings or grounds, and municipal improvements, such as street widening or sewer or water system work. These activities typically involve excavation in paved or landscaped areas, for which there must be a corresponding restoration effort as part of completing the work. The cost associated with service maintenance supports SDG&E's commitment to mitigate risks associated with hazards to public safety, infrastructure integrity and system reliability.

b. Forecast Method

Given the general variation in the drivers and the influence these have on the overall cost basis in this workgroup, a five-year average spending for the period 2009 through 2013 was used to forecast the base level of funding needed for TY2016. Added to this base average expenditure level are incremental work elements necessary to adequately fund the operations for the forecast years 2014 through 2016. These work elements are described below.

The total funding required over the 2013 adjusted-recorded base, including the incremental additions in this workgroup, is $61,000 in TY2016.

i. Separately-Protected Service Line Project

Pipeline Hazardous Material and Safety Administration (PHMSA) enforcement guidance published in January 2013 clarifies PHMSA's interpretation of CFR 192.465 regarding the cathodic protection survey cycle for isolated steel risers interconnected by tracer wire and protected by either a common magnesium anode or a series of magnesium anodes. This is discussed in greater detail below in Section II.B (Field Operations and Maintenance – Cathodic Protection) of my testimony.

Interconnected risers were installed on new polyethylene main and service systems between 1971 and the early 1980s resulting in what SDG&E now estimates to be 45,000 steel risers impacted by the PHMSA interpretation. To reach alignment with the adopted interpretation, SDG&E will conduct annual surveys on this group until such time as the steel risers are either independently cathodically protected and can be returned to the once every ten

years cathodic protection survey program, pursuant to CFR 192.465, or are replaced with anodeless risers, eliminating the need to survey for adequate cathodic protection.

Initial efforts will focus on independent protection, as the most efficient and least-costly means of aligning with the interpretation. Survey data sorts the 45,000 risers into one of three categories: cathodic protection tracer wire exposed (above grade) in soil/grass/vegetation; tracer wire exposed (above grade) in concrete or asphalt; tracer wire not exposed (below grade). Cathodic protection electricians will require additional assistance from Service Maintenance crews where the tracer wire is in concrete/asphalt or is below grade.

a) Riser Excavation for the Separately Protected Service Line Project

SDG&E projects 20% of steel risers will require excavation through dirt to expose the cathodic protection tracer wires and install one-pound magnesium anodes. Incremental costs for a Gas Crew and non-labor costs are estimated to be $200,000 in 2015, $32,000 in 2016 and thereafter. The incremental funding needed over the base forecast for this upward pressure is $32,000 for TY2016.

b) Core-hole at Riser for the Separately Protected Service Line Project

SDG&E projects 30% of steel risers will require excavation through concrete or asphalt to expose tracer wires and install one-pound magnesium anodes. Incremental labor and non-labor costs for a Street Repair crew to perform this repair work are estimated to be $223,000 in 2015, and $25,000 in 2016 and thereafter. The incremental funding required over the base forecast for this upward pressure is $25,000 for TY2016

c. Cost Drivers

The work completed in this workgroup is driven by the requirement to meet federal and state pipeline safety regulations and to protect the integrity of the pipeline system through activities that extend its life. These activities support SDG&E's commitment to mitigate risks associated with hazards to public safety, infrastructure integrity and system reliability. As outlined above, multiple factors influence the level of spending on service maintenance in a given year. These factors include:

- <u>The number of leaks evaluated and repaired each year</u>. This work is generally completed to address public safety, infrastructure condition, and material failure. As

discussed previously, leaks are found by employees conducting leak survey, and other field activities or by customers who call reporting a gas odor.

- The level of repairs associated with damages to pipeline facilities by third parties, outside sources, or causes such as fire or flooding. This cost is driven by the number and severity of the damage. Damages are typically driven by the level of construction in the private and public sector, which is typically driven by economic conditions.
- Requirements to alter gas service lines and MSAs to correct unsafe conditions or changes in customer load usage. This also includes work to change, raise, or lower service valves; and repair or replace curb valves or meter boxes.
- The level of work completed by municipalities. Typical municipality projects include street resurfacing, widening or reconstruction; and sewer and water pipeline maintenance, replacement or new installations. Per applicable franchise agreements, SDG&E is required to complete associate maintenance, such as: raising or lowering valve casings and lids; altering the elevation of pipeline segments in their present locations; or relocating pipeline segments or related facilities completely. The impact to SDG&E can vary significantly, depending on the availability of municipality funds, which are typically driven by economic conditions. As economic conditions continue to improve, construction by municipal agencies is likely to increase.

6. Tools, Fittings, and Materials

Recorded to this workgroup is the purchase of small tools, small pipe fittings, miscellaneous pipeline materials, and miscellaneous installation materials used during construction and maintenance activities and those held in inventory as vehicle truck stock. Table FBA-09 below summarizes Gas Distribution O&M costs associated with Tools, Fittings and Materials activities.

Table FBA-09
San Diego Gas & Electric Company
Field O&M – Tools, Fittings and Materials

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
6. Tools Fittings & Materials	328	467	139

a. Description of Costs and Underlying Activities

The tools, fittings and materials purchased under this workgroup are necessary to obtain complete and safe work results. Included within each category of materials are items, such as:

- Small tools, including screw drivers and wrenches;
- Pipe materials used in maintenance and construction activities, such as service alterations, service leak repairs, riser repairs and replacements, and maintenance of meter and regulator facilities on distribution services;
- Miscellaneous installation and pipeline materials, such as pipe wrap, gaskets, washers, bolts, stakes, and pipe straps used by field employees to complete pipeline maintenance and replacement activities; and
- Pipe fittings, two-inch pipe size and smaller, commonly used during construction and maintenance work; and coveralls, uniforms, and charges for rental and laundering of these garments.

b. Forecast Method

The forecast method developed for this cost category is a five-year average for the period 2009 through 2013. This method is most appropriate because this is a grouping of expenses that can fluctuate from year to year, depending on the level of construction and maintenance activities. The total funding required over the 2013 adjusted-recorded base in this workgroup is $139,000 in TY2016.

c. Cost Drivers

The rate of consumption of the materials covered in this workgroup is primarily driven by construction and maintenance activity, which in turn, is often a reflection of economic conditions. Other drivers include the level of field workforce that requires tools and materials, as well as the cost at which SDG&E is able to obtain tools, fittings and materials used by its employees. As these cost pressures increase, they impact the overall cost for this activity.

7. Electric Support

Recorded to this workgroup is the labor and non-labor expense incurred by Gas Distribution crews that have been specially trained to provide traffic control services for Electric Distribution crews during inspections under the Corrective Maintenance Program. Table FBA-10 below summarizes Gas Distribution O&M costs associated with Electric Support activities.

Table FBA-10
San Diego Gas & Electric Company
Field O&M – Electric Support

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
7. Electric Support	606	737	131

a. Description of Costs and Underlying Activities

General Order 165 mandates specific inspection cycles for electric distribution facilities. Other inspections are covered by General Order 95 (Overhead Electric Line Construction) and General Order 128 (Underground Electric Supply Construction), which direct utilities to frequently and thoroughly inspect electric distribution equipment. These inspections are part of SDG&E's Electric Distribution Corrective Maintenance Program and are further described in the Prepared Direct Testimony of Jonathan Woldemariam, Exhibit SDG&E-10.

b. Forecast Method

In preparing the forecast for this workgroup, SDG&E reviewed 2009 through 2013 historical spending levels for gas crews assisting Electric Distribution with traffic control. The forecast method developed for this cost category is a five-year average for the period 2009 through 2013. This method is most appropriate because the level of activity in this workgroup can fluctuate from year to year, depending on the level of Corrective Maintenance Program work. The total funding required over the 2013 adjusted-recorded base in this workgroup is $131,000 in TY2016.

c. Cost Drivers

The cost drivers behind this forecast are electric Corrective Maintenance Program activities utilizing gas distribution resources for traffic control.

8. Supervision and Training

Recorded to the Supervision and Training workgroup are labor and non-labor expenses for employee field skills training, field supervision and management, and miscellaneous expenses related to SDG&E's gas operations. Table FBA-11 below summarizes Gas Distribution O&M costs associated with Supervision and Training activities.

Table FBA-11
San Diego Gas & Electric Company
Field O&M – Supervision and Training

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
8. Supervision & Training	2,498	2,841	343

a. Description of Costs and Underlying Activities

Field skills training for SDG&E's Gas Distribution personnel accounts for the majority of the 2013 adjusted-recorded base spending in this workgroup. Gas construction employees attend training because they are new to their job, require operator qualification, need refresher training, are promoted to a position requiring additional technical skills, or need additional training due to the deployment of new equipment with new technology or changes in regulations. These field expenses include general training costs for SDG&E District Operating Centers and Gas Technical Services personnel.

The second significant source of expenditure in this workgroup is in the area of field supervision. Field supervisors have one of the most challenging and critical positions at SDG&E. They are responsible for the supervision and inspection of field construction and maintenance work performed by both SDG&E crews and by contractor crews. They are in a position of influence with front-line employees and are responsible for coaching and mentoring these employees to work safely, follow Company procedures, and maintain and build a safe and reliable natural gas delivery system.

The final area of expense contribution for this workgroup is comprised of miscellaneous operating expenses. These non-labor expenses include office supplies, telephone expenses, mileage expenses, and professional dues.

b. Forecast Method

An increase in skills development and operator qualifications training began in 2013. This increase in activity is expected to continue. For this reason, 2013 adjusted recorded was selected as the base level of expense. In the forecast years, additional training activity associated with Operator Qualification, including the increase in the number of tasks and the frequency of qualifications will cause costs in this group to increase above this base level of expense. Added to this base expenditure level are incremental additions necessary to adequately fund the

activities in this workgroup in TY2016. The total funding required over the 2013 adjusted-recorded base including the incremental additions in this workgroup is $343,000 in TY 2016. Below is an explanation of the incremental requirements.

i. Operator Qualification and Skills Training

Safety is rooted in all phases of gas distribution training. An integral component of overall workforce proficiency is the Operator Qualification program. SDG&E is expanding its Operator Qualification program to better align with recommendations by CPUC auditors, and increase the level of employee qualification. This includes adding new qualification elements, adding new tasks within the new and existing qualification elements, developing qualification materials, establishing an electronic record-keeping process, and conducting training and qualification of impacted employees. In addition, the frequency for subsequent qualification will be increased, in alignment with emerging industry leading practices.

The Operator Qualification program requirements are further discussed in the Operations Management and Training workgroup later in this testimony. The expanded Operator Qualification program in this workgroup for District field employees and Leak Survey personnel will add approximately 7,200 incremental training hours required to qualify these Field employees in the new Operator Qualification elements and new tasks. The incremental increase over the base forecast associated with this upward pressure is $343,000 in TY 2016.

c. Cost Drivers

Services provided within the Supervision and Training workgroup are driven by the amount of field work to be completed, the number of employees and associated supervision and management workforce, and training and operator qualification requirements, as further described below:

- The level of general construction work in the private and public sectors. Construction activity is generally driven by economic conditions. This in turn can drive SDG&E's operations and maintenance work levels, potentially resulting in the need for increased workforce, contractors, and supervisors.
- Increase in employee training and qualification requirements. This cost is normally driven by an increase in workforce, increase in employee movement, changes in regulatory requirements, or changes in work practices. SDG&E expects that employee training will increase due to the expansion of the Operator Qualification

requirements. Additional details regarding expansion of the Operator Qualification program is provided below in Section II. C (Operations Management and Training).

- The level of office materials, equipment and services needed to support gas distribution personnel completing operations and maintenance work. This encompasses such items as general office supplies, business forms, pagers, cell phones and employee expenses. This cost is also driven by the level of workforce in need of these materials, as well as the cost at which SDG&E can acquire these items.

9. Measurement and Regulation

Recorded to the Measurement and Regulation workgroup are labor and non-labor expenses for inspection and maintenance of distribution regulator stations, valve maintenance, meter set inspections, electronic instrumentation maintenance, and meter removals for accuracy checks to maintain compliance with General Order 58-A. Table FBA-12 below summarizes Gas Distribution O&M costs associated with Measurement and Regulation activities.

Table FBA-12
San Diego Gas & Electric Company
Field O&M – Measurement and Regulation

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
9. Measurement & Regulation	3,058	3,464	406

a. Description of Costs and Underlying Activities

Regulator stations reduce the pressure of gas entering the distribution system from high pressure supply pipelines to the lower pressures used in the distribution pipeline network. SDG&E has approximately 485 regulator stations. Federal pipeline safety regulation 49 CFR 192.739(a) requires periodic inspections and maintenance of all regulator stations, including both underground vaults and above-ground regulator station enclosures. Pressure checks are made to verify that the station is operating as intended and that the station's over- and under- pressure protection devices perform as designed. If a station does not perform properly, internal maintenance and inspections are performed, consisting of disassembling the regulator devices and inspecting the internal components for worn or damaged parts. Any faulty parts are replaced and the regulator is cleaned and inspected for corrosion. Activities for repairing damage to

regulator station vaults caused by general deterioration or long-term exposure to heavy traffic, and rebuilding pressure regulators and pressure relief valves, are additionally charged within this workgroup.

Also included are expenses for the inspection and calibration of electronic pressure monitors used to measure and record distribution system pressures, gas volume correctors used to record gas consumption, and ten-year rotary meter changes or calibrations to comply with General Order 58-A for large customers. The activities covered in this workgroup support SDG&E's commitment to mitigate risks associated with hazards to public and employee safety, infrastructure integrity and system reliability.

b. Forecast Method

In 2013, SDG&E started to develop additional Operator Qualification tasks, training modules for employee development, and implemented a regulator station internal parts replacement program. This level of activity is expected to continue in the forecast years. For this reason, 2013 adjusted recorded was selected as the base. Added to this base expenditure level are incremental additions necessary to adequately fund the operation in TY2016. Below is an explanation of the incremental requirements.

The total funding required over the 2013 adjusted-recorded base including the incremental additions in this workgroup, described below, is $406,000 in TY2016.

i. <u>Tapping Equipment Factory Maintenance</u>

Pipeline tapping and plugging machines are used to perform maintenance and construction operations safely and cost effectively on active gas mains. These devices allow uninterrupted service to be preserved while the gas infrastructure is being maintained, relocated or expanded.

Maintenance of all equipment, especially steel cutting (tapping) and plugging equipment, is critical to the safe operation and functionality of the tool. Manufacturers periodically update equipment specifications to enhance operation or to provide additional safety measures. Even though SDG&E has been performing periodic maintenance on this equipment, to enhance the tools' inspection process, SDG&E is continuing its effort to systematically return the equipment to the factory for refurbishment, product updates and any warranty repairs. On an annual basis, SDG&E will send two out of its seven tapping and plugging machines to the manufacturer for

required servicing. An incremental increase of $7,000 to the base forecast in TY2016 is required for maintenance of this equipment.

ii. Borrego LNG Facility - Security Monitoring

SDG&E owns and operates a small Liquefied Natural Gas (LNG) facility at the Road Runner Mobile Home Park in Borrego Springs, California. This area is isolated from any gas distribution pipelines and approximately two hours travel time from the responsible maintenance group. LNG is vaporized and distributed for residential use at the Roadrunner Mobile Home Park serving approximately 300 mobile homes. The facility is located on the grounds of the mobile home park. It is unmanned, considered remote, approximately one acre in size, and secured by a locked fence and monitored 24/7 by a security system. Currently, the Borrego LNG Facility is protected by a security system consisting of fence-line intrepid alarms, interior motion detection, a stereo camera system, and facility wide lighting. The security system is monitored 24/7/365 by SDG&E's Mission Security Operations department. In 2014, the security system will be upgraded to include a new improved communications network with Mission Security Operations who will monitor this critical facility. An incremental increase of $21,000 above the base forecast in TY2016 is required for the annual security monitoring communication fees.

iii. Electronic Pressure Monitor Communication Network Conversions

Electronic pressure monitors are used by SDG&E to remotely monitor distribution pipeline pressures in support of gas system capacity analysis and as a warning system to communicate system pressures outside of normal limits. The primary purpose of the EPM network is system safety and compliance with 49 CFR 192.741. Currently SDG&E has 165 wireless units that operate on the Verizon Wireless communications network. The associated communications arrangement with Verizon is a voice line plan. At the end of 2014, Verizon Wireless will require this type of equipment operate on an Internet Protocol plan similar to other data streaming devices such as tablets and mobile broadband cards. In 2014, SDG&E will incur a one-time expense of $23,000 to perform the on-site communications conversion from the voice plan to the Internet Protocol plan by reprogramming at 165 electronic pressure monitor locations.

iv. Electronic Corrector Replacement

Electronic volume correction devices are installed on higher-than-standard pressure (0.5 psig and higher) meters for large volume customers to correct measured gas volumes for temperature and pressure. Correcting devices are only used after all other options have been

exhausted for accurate billing to comply with General Order 58-A and SDG&E Gas Tariff Rule 2.[9] Replacement parts for electronic volume correctors are in short supply and, in many cases, obsolete and unavailable. Mercury Instruments, the manufacturer of the correctors, no longer supports the corrector models that are older than ten years. SDG&E currently has 70 units that fit this age criteria. SDG&E must replace these units with updated technology in order to maintain accurate billing to its customers. Therefore, an incremental increase of $40,000 is required to the base forecast in TY2016 to replace these outdated electronic volume correction devices.

v. Enhanced Valve Maintenance

In their joint PSEP, first filed in August 2011 in Rulemaking 11-02-019 (the Pipeline Safety Rulemaking), SoCalGas and SDG&E requested approval and recovery of the revenue requirements resulting from capital and O&M forecasts for the PSEP for years 2011 through 2015, to coincide with SoCalGas and SDG&E's anticipated next General Rate Case cycles. The PSEP included a valve enhancement plan. The expense forecasts for the valve enhancement plan included incremental O&M costs to support the operation and maintenance of the enhanced valves and related infrastructure to be installed as part of the PSEP through 2015. It was contemplated that in subsequent years (2016 and beyond) O&M costs associated with facilities and equipment previously-installed as part of PSEP would be recovered in the utilities' TY2016 funding requests as part of their overall operation and maintenance of their gas infrastructure. Consistent with this approach, my testimony includes the TY2016 costs of operating and maintaining the enhanced valves and related infrastructure installed through 2015 as part of PSEP.[10]

For the Meter and Regulator and Instrument Shop departments, these costs are associated with the incremental maintenance for: valve, actuators and related distribution system control components added under the PSEP Valve Plan to isolate and depressurize critical pipelines in the event of a rupture; maintenance of enhanced flow measurement and telemetry equipment at new pipeline locations; and new check valves and other enhancements to prevent the back-flow of gas

[9] SDG&E Tariff Rule 2, Advice letter 1863-G.

[10] In D.14-06-007, the Commission approved the PSEP, but not recovery of the forecasted costs of implementing the PSEP. Instead, actual PSEP costs will be reviewed and approved through a reasonableness review application process. Through that application process, SoCalGas and SDG&E will seek recovery of actual incremental O&M costs associated with operating and maintaining the enhanced valves through 2015.

into major pipeline isolation sections to be depressurized. The cost of maintaining radio system enhancements to support the PSEP valves, meter and other asset operation and monitoring are also included. This incremental safety requirement represents a TY2016 increase of $149,000 over the forecast base.

vi. Regulator Station Internal Parts Replacement

As a prudent operator, SDG&E takes action to proactively address potential safety, integrity or reliability issues. Beginning in 2013, SDG&E adopted a regulator internal parts replacement program. The purpose of this program is to proactively enhance the reliability of district regulator stations by scheduling parts replacement at pre-defined intervals.

Regulator and serviceable parts useful lifespan was analyzed at SoCalGas, and recommended parts replacement schedules were developed to optimize the life of the regulator minimizing the risk of potential failures. Similarly, SDG&E has evaluated its regulators currently in service and set up an internal parts replacement program based on replacement criteria, including regulator type, age, service history, and serviceable parts projected lifespan. To fund this program, an incremental increase of $32,000 is required over the base forecast for TY2016 for the internal parts replacement program.

vii. Operator Qualification and Skills Training

Safety is rooted in all phases of Gas Distribution training. An integral component of overall workforce proficiency is the Operator Qualification program. SDG&E is expanding its Operator Qualification program to better align with industry standards and feedback from the CPUC. This includes adding new qualification elements, adding new tasks within the new and existing qualification elements, developing qualification materials, establishing an electronic record keeping process, and conducting training and qualification of impacted employees. In addition, the frequency for subsequent qualification will be increased in alignment with emerging industry leading practices.

Operator Qualification program requirements are discussed further in Section II.D (Operations Management and Training) of this testimony. The expanded Operator Qualification program in this workgroup for Pipeline Operations and Instrument Shop field employees will add approximately 1,320 incremental training hours required to qualify these field employees in the new Operator Qualification elements and new tasks. The incremental increase over the base forecast associated with this upward pressure is $67,000 in TY2016.

viii. Small Tools for Mueller Pressure Control Truck

As discussed above in the Tapping Equipment Factory Maintenance section, pipeline tapping and plugging (pressure control) machines are used to perform maintenance and construction operations safely and cost effectively on active gas mains. These devices allow uninterrupted service to be preserved while the gas infrastructure is being maintained, relocated or expanded. The tapping and plugging machines and associated miscellaneous equipment are transported in a specialized heavy duty vehicle based on the International 4400 chassis featuring a hydraulic crane, air compressor, and storage cabinets. The costs associated with this specialized vehicle may be found in the prepared direct testimony of Carmen Herrera, Exhibit SDG&E-16.

The pressure control truck is utilized for tapping and plugging operations on three-inch and larger steel gas mains. Currently SDG&E operates one of these specialized vehicles and is limited in the number of tapping and pressure control work performed in a single day. As with any vehicle, there are routine maintenance requirements and occasional breakdowns of the vehicle itself or specialized equipment on board, such as the hydraulic crane or air compressor. When the vehicle is not in working condition, SDG&E is limited in its ability to perform tapping and pressure control operations for routine and emergency work, having to temporarily transfer critical equipment to a smaller vehicle, a labor- and time-intensive undertaking. SDG&E will therefore outfit a second International 4400 pressure control vehicle to allow for more than one pressure control job to be scheduled in a given day and to augment emergency response capabilities which may require this equipment. In addition to the vehicle and pressure control equipment, small tools such as screw drivers, pliers, hoses, clamps, pressure gauges are required to outfit the vehicle. A one-time expense of $20,000 will occur in 2015 over the forecast base to outfit the vehicle with necessary tools.

ix. Pipeline Operations Supervisor

Based on the nature and volume of work challenging the Gas Distribution organization, an additional Pipeline Operations Supervisor is required. Most notably, is the need to have a supervisor in the field on a regular basis to lead, train and reinforce operational safety.

The Pipeline Operations group has increased its workforce by more than 10% since 2010 in order to meet the safety-sensitive requirements of a growing system. Large projects resulting from new customer demands, large high-pressure gas pipeline construction activities associated

with relocations, renewals and system growth, and inspection activities have placed increasing pressure on Gas Distribution Pipeline Operations supervisors to manage and maintain accountability for their workforce.

Given the highly technical and safety-sensitive nature of its work, Distribution Pipeline Operations, more than any other SDG&E Gas Distribution work group, has a large volume of annual safety training, Gas Standard reviews and Operator Qualification training requirements that have a significant impact on supervisor time. Additionally, Pipeline Operations is deploying a regulator change and internal parts replacement program to mirror the longstanding processes used by SoCalGas to address device reliability and mitigate risk. Daily trouble orders associated with gas leaks, pressure issues and customer service require crews to be dispatched in a timely manner with supervisory backup that can be called upon to support gas emergencies throughout the SDG&E service territory.

Considering these ongoing pressures on supervisors and the need to have a supervisor in the field on a regular basis, the requirements listed above demonstrate the need for an additional supervisor. The total incremental funding for the addition of this supervisor is $90,000 above the base forecast for TY2016.

c. Cost Drivers

Work activities within the Measurement and Regulation workgroup are driven by regulatory requirements, as well as the need to mitigate risks associated with hazards to public and employee safety and system reliability. Costs drivers associated with this workgroup include:

- The number of inspections and follow-up maintenance that must be completed at each of the facilities maintained by the Measurement and Regulation team. These facilities include regulation stations, valves, MSAs, pressure/volumetric correctors, and electronic pressure monitors.
- The volume of recurring routine, scheduled maintenance work and unscheduled maintenance work. Unplanned work includes, for instance, work driven as a result of the malfunction of a device.
- Emergency support requirements. This includes activities to responding to a shutdown caused by pipeline damage, a pressure incident or major event as in the

case of an earthquake, and support of general operations requirements for example test shut downs to determine system behavior under specific conditions.

- The age and type of equipment installed. Generally, older or obsolete equipment requires more frequent and more extensive maintenance work.
- Other cost drivers. These include customer requests associated with measurement issues at MSAs and regulatory requirements for additional or stricter standards.

10. Cathodic Protection

Expenses for activities recorded to the Cathodic Protection workgroup are for the inspection, evaluation, and monitoring of the CP system on SDG&E's steel distribution pipelines to maintain and operate the system in accordance with state and federal regulations. Table FBA-13 below summarizes Gas Distribution O&M costs associated with Cathodic Protection activities.

Table FBA-13
San Diego Gas & Electric Company
Field O&M – Cathodic Protection

GAS DISTRIBUTION			
Shown in Thousands of 2013 Dollars			
B. Field Operations & Maintenance	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
10. Cathodic Protection	1,034	1,867	833

a. Description of Costs and Underlying Activities

Buried steel pipelines will corrode and revert back to their natural state as an iron oxide without proper intervention. Corrosion on pipelines increases the potential for leaks, and may reduce the pipeline's useful life. In addition to the application of coating and electrical isolation, cathodic protection is one method for mitigating external corrosion on steel pipelines. CP combats corrosion by imposing an electric current flow toward the surface of the pipeline, which keeps the pipeline negatively charged (cathodic) with respect to the surrounding soil. CP systems are at risk of interference from construction or operations of nearby utilities, such as water lines, telephone, or cable television ground systems, and electric railway power systems, all of which can reduce the performance of the CP system. The CP system requires continual monitoring for interference, measurement of its performance, and maintenance of its associated equipment to ensure that adequate levels of protection are maintained.

These efforts are undertaken to maintain the longevity and performance of SDG&E's distribution steel pipeline system and are performed by system protection specialists responsible for maintaining compliance with appropriate regulations. Inspection, evaluation, and monitoring of the pipelines' CP system can include: checking rectifiers for proper operation, identifying the location of interface bonds, evaluating "short circuits," identifying locations for installation of anodes for continued pipe protection, and taking pipe-to-soil reads to evaluate electric current levels. Based on the results of these monitoring activities, replacement, upgrade, or alteration of the CP system components may be planned. Diminished CP effectiveness could lead to increased corrosion, a more rapid deterioration of the steel pipeline and subsequently increased leakage, thus leading to potential risks associated with public safety and infrastructure integrity.

b. Forecast Method

SDG&E's base forecast for this compliance workgroup is the 2013 adjusted recorded base level of spending. The 2013 adjusted recorded base level of funding captures the recently implemented requirement for NACE level 1 certification for CP electricians. This certification process and associated skillset improvement has resulted in increased number of random reads and more time dedicated to troubleshooting and implementing long term solutions to CP station shorts. This level of activity is expected to continue in the forecast years. Added to this base expenditure level are incremental additions necessary to adequately fund the operation in TY2016. The total funding required over the 2013 adjusted-recorded base including the incremental additions in this workgroup is $833,000 in TY2016. Below is an explanation of the incremental requirements.

i. <u>Separately-Protected Service Line Project</u>

PHMSA enforcement guidance published in January 2013 clarified PHMSA's interpretation of CFR 192.465, which pertains to the required annual survey cycle for more than one steel riser electrically-connected together and cathodically protected by a common magnesium anode or a series of interconnected magnesium anodes. Since the early 1970s, SDG&E has been treating steel risers cathodically protected with this method as an individually-protected steel pipe segment and surveying 10% of the entire population of steel risers every year and each riser once every ten years as, pursuant to CFR 192.465 for steel pipeline segments less 100 feet in length. These segments are referred to as "CP10s."

SDG&E's practice of interconnecting steel risers together using tracer wire and magnesium anodes (or "daisy chaining" risers) began in 1971 when the Company first began installing polyethylene mains and services in the service territory, and continued until 1982, when the practice was stopped and anode less risers were installed on polyethylene services.

This method of daisy chaining steel risers for CP protection and surveying them as CP10s, once every ten years, pursuant to CFR 192.465, was also employed by other gas utility companies in the Southwest, as the use of polyethylene mains and services became an alternative pipeline material for installing new gas systems in the early 1970s. The practice stopped in the early 1980s when anodeless risers became an acceptable alternative to steel risers on new polyethylene service installations.

In 2005, at the urging of a gas utility serving the City of Mesa Arizona, PHMSA rendered an interpretation of CFR 192.465 that helped clarify the survey interval for daisy-chained steel risers. The interpretation states that these steel risers are electrically connected and therefore, are an "electrical" system and should be surveyed annually, not every ten years like a CP10. Specifically, Interpretation: PI-ZZ-069, dated November 9, 2005, states:

> This interpretation of section 192.465 clarifies the definition of the term "separately protected service lines" to mean a buried or submerged service line that is electrically isolated and cathodically protected from other metallic structures. The interpretation also explains that separate steel service risers that are electrically interconnected and cathodically protected by a common source are not separately protected lines; and that therefore, § 192.465(a) requires an operator to monitor such pipelines at least once each calendar year, but with intervals not exceeding 15 months, to determine whether the cathodic protection meets the requirements of § 192.463.

Since 2005, utilities made aware of the PHMSA interpretation have begun implementing changes in their survey process, which include replacement of a steel riser with an anodeless riser if the steel riser is not passing minimum CP criteria. SDG&E became aware of this interpretation in 2012 and promptly began researching and analyzing a process to gain alignment with the PHMSA interpretation. In 2013, the United States Department of Transportation (DOT) adopted the PHMSA interpretation.

Daisy-chained risers were only installed on new polyethylene main and service systems, and SDG&E estimates 45,000 risers exist today that require an annual survey. SDG&E has initiated a process to survey these steel risers annually.

To reach alignment with the adopted PHMSA interpretation, SDG&E will require additional Project Lead Team and Cathodic Electrician C classification resources to conduct the annual surveys and remediate steel risers not passing the minimum pipe-to-soil criteria potential read of -.85 volts. Remediation will include cutting the steel riser tracer wire and separating the riser from the "daisy chain" and installing a one-pound magnesium anode to establish a separately-protected steel riser. Once this is accomplished, the riser will be classified as a CP10 and surveyed once every ten years pursuant to 49 CFR 192.463.

a) Project and Survey Personnel for the Separately-Protected Service Line Project

Establishment of the Separately-Protected Service Line Project annual survey process, validation and initial management of the large volume of data in SAP, and associated project start-up needs will require a dedicated Team Lead and a Technical Service Assistant in 2015 and 2016, with an expectation that the positions will be eliminated in 2017 once the program is established. Incremental costs for this Lead Team will be $140,000 in 2015 and $140,000 in 2016. In order to perform the new annual survey on 45,000 riser locations, additional Cathodic Electrician C classification resources are necessary. Incremental costs are estimated to be $384,000 for labor and $59,000 for non-labor in 2015 and $384,000 for labor and $59,000 for non-labor in 2016 and thereafter. The total incremental funding needed over the base forecast for this upward pressure is $583,000 for TY2016.

b) Remediation Work Performed by Electrician for the Separately-Protected Service Line Project

Survey data sorts the 45,000 risers into one of three categories: cathodic protection tracer wire exposed (above-grade) in soil/grass/vegetation; tracer wire exposed (above-grade) in concrete or asphalt; and tracer wire not exposed (below-grade). For locations not passing minimum CP criteria, CP electricians will remediate where the tracer wire is exposed and the placement of the anode is, through soil/grass/vegetation. Cathodic Protection Electricians will require assistance from Street Repair and Gas Crews for the remaining two categories. Refer to Section II. B (Field Operations and Maintenance) above for additional discussion.

Incremental costs are estimated to be $44,000 labor and $80,000 non-labor in 2015, and $5,000 labor and $9,000 non-labor in 2016 and thereafter.

The total incremental funding needed over the base forecast for this upward pressure is $14,000 for TY2016.

ii. Operator Qualification and Skills Training

Safety is rooted in all phases of gas distribution training. An integral component of overall workforce proficiency is the Operator Qualification program. SDG&E is expanding its Operator Qualification program to better align with recommendations by CPUC auditors, and increase the level of employee qualification. This includes adding new qualification elements, adding new tasks within the new and existing qualification elements, developing qualification materials, establishing an electronic record keeping process, and conducting training and qualification of impacted employees. In addition, the frequency for subsequent qualification will be increased in alignment with emerging industry leading practices.

The Operator Qualification program requirements are further discussed in Section II. D (Operations Management and Training) later in this testimony. The expanded Operator Qualification program in this workgroup for Cathodic Protection field employees will add approximately 440 incremental training hours required to qualify these field employees in the new Operator Qualification elements and new tasks.

The incremental increase over the base forecast associated with this upward pressure is $26,000 in TY2016.

iii. CP Workforce Development

SDG&E recognizes the unique skillset required to understand, troubleshoot, and maintain CP systems. Recently SDG&E has increased the effort to develop and train CP technicians and electricians to follow industry leading practices and establish a more stringent training and progression structure for CP personnel.

Currently the CP field workforce consists of Electricians and Technicians. A new employee typically joins the workforce as a Technician C and currently is operator qualified in four covered tasks performing basic pipe to soil potential reads and basic troubleshooting for shorts. On average, 6 months of formal and informal field training and one additional operator qualification will allow the employee to move up to a Technician B. As a Technician B the employee will typically continue to perform basic pipe to soil reads along with critical bond

checks ensuring the bond between SDG&E facilities and other outside CP operator systems (Water Departments, light rail agencies) is intact and mitigating any CP interference issues. On average, 6 months of formal and informal field training and five additional operator qualifications will allow the employee to move up to a Technician A at which point they are in a holding pattern until a CP Electrician position becomes available. As a CP Electrician the employee must acquire NACE CP1 certification.

Currently SDG&E has a number of CP employees in the lower classifications (Cs and Bs) progressing up into the higher level classifications (Bs and As) over the forecast years. This will require addition labor expense above base forecast levels.

To further develop the progression structure and retain trained and qualified staff in the CP department SDG&E is adding a Lead Electrician position starting in 2015. A lead position is required to help provide field leadership, direction, training, and to perform more in-depth analysis on CP stations to ensure CP system integrity and thus achieving improved pipeline integrity. Additional pipeline integrity requirements have been placed on the gas pipeline industry in recent years as a result of the addition of the DOT pipeline integrity program and State and Federal regulatory response to the recent pipeline incident in San Bruno. This Lead Electrician position will help ensure we continue to meet our code compliance activities for CP station inspections, maintenance, and ensure our CP employees are sufficiently trained to meet those goals.

As steel pipelines age the protective coating tends to deteriorate and the required levels of CP protection increase. This often results in accelerated depletion of CP groundbeds and the reevaluation of system boundaries and impressed current system locations. As these issues arise it typically can take up to 6 months to design, plan, permit, and construct CP improvements. In order to optimize CP system effectiveness and minimize station down time due to depleted anodes SDG&E will be adding a Cathodic Protection Technical Advisor. The technical advisor can perform ongoing analysis and proactively identify improvements to maintain and improve corrosion control. The Incremental labor associated with the Cathodic Protection Technical Advisor for analysis and management of CP system improvement projects will begin in 2015 and continue post TY2016.

The total incremental funding needed for this workgroup element is $210,000 over the forecast base for TY2016.

The Lead Electrician and CP Technician A positions forecasted in this area require SDG&E to add one incremental light duty truck in 2014, and one in 2016. The costs associated with these vehicles can be found in the prepared direct testimony of Ms. Carmen Herrera, Exhibit SDG&E-16.

c. Cost Drivers

The basic cost drivers for this workgroup include the number of inspections and associated evaluations (troubleshooting) that must be completed each year for each CP area and isolated CP segment. Based on the results of these monitoring activities, follow up maintenance action is often necessary. These maintenance activities may include replacing, upgrading or altering components of the CP system, such as anodes, rectifiers, beds, bonds, test points, electric drops, anode wells, and insulators. Many of these activities are driven by the age of the system components, with older elements generally requiring more maintenance.

Furthermore, the typical life of anodes, a critical component of the CP system, can vary depending on a number of drivers including the weather, soil conditions, the pipeline length it is protecting and the effectiveness of the pipe's coating. Anode depletion is accelerated by drought conditions, as dry soil does not allow the current to travel as far and protect as much pipe. In addition, some soils are more resistive than others, causing anodes to deplete at a higher rate.

CP maintenance work is often reactive to activities of municipalities, other utilities, and construction firms as they complete projects of street reconstruction, widening, or resurfacing; or sewer and water line maintenance and replacement as these activities can lead to CP component damage. In addition, pipes can come into contact with water lines or with third-party grounding systems that can drain current from the pipeline, thus reducing the level of protection and depleting anodes. Customers placing metal objects against an MSA riser can have the same effect as shorting out the CP current.

C. Asset Management – Pipeline O&M Planning

Table FBA-14
San Diego Gas & Electric Company
Asset Management – Pipeline O&M Planning

Shown in Thousands of 2013 Dollars			
C. Asset Management	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
1. Asset Management	1,624	1,848	224
Total	**1,624**	**1,848**	**224**

1. Asset Management

a. Description of Costs and Underlying Activities

Asset Management includes activities and associated O&M expenses incurred in the evaluation of the condition of the distribution system. This includes maintaining asset records, identifying corrective maintenance solutions, and coordinating with field personnel on completion and recording of O&M activities.

Recorded to this workgroup are labor and non-labor expenses for pipeline maintenance technical planning office personnel, regional engineering, pipeline mapping personnel, various analytical and administrative support positions, and associated supervision. SDG&E's Technical Planning Office provides many of the technical and administrative services needed for the successful and timely completion of the O&M activities discussed in Section II.A above. Activities performed by this planning office include items such as:

- Identify construction design requirements;
- Evaluate pressure specifications;
- Coordinate pipeline planning;
- Provide project drawings;
- Identify material selection;
- Prepare work order estimates;
- Acquire third party contract services (e.g. paving, traffic control plans, and operated equipment);
- Obtain permits for construction from city, county, state, and federal agencies; and
- Verify that services provided by third parties meet company standards.

The Technical Planning office also coordinates the regions' emergency response efforts by managing the Gas Emergency Center, which is located at the region's headquarter facility. The Gas Emergency Center is the regional command center that is activated during a significant event (*e.g*. fire, earthquake, pipeline damage, customer outage) to support field operations with engineering, pipeline planning, mapping, logistics, and office resources that are vital in returning SDG&E's facilities back to normal operations.

This workgroup additionally includes expenses to map the pipeline facilities. As gas system construction projects are completed throughout SDG&E's service territory, accurate maps must be created and records kept for the life of the pipeline, consistent with General Order 58-A. Projects requiring mapping and records work include all new business activity, pipeline relocations, main extensions, pressure betterment projects, pipeline replacements, and various other operational activities that change the gas system configuration. The recent transition to a Geographic Information System (GIS) based mapping system adds the capability to capture pipeline attribute data, and this data is added to the facilities when mapped in GIS. GIS mapping personnel are responsible for updating all distribution infrastructure maps whenever facilities in the field are constructed, modified or replaced. The timely maintenance of these gas distribution system records is a critical risk mitigation measure in preventing hazards to public and employee safety, infrastructure integrity and to the reliable delivery of natural gas to SDG&E customers.

b. Forecast Method

In developing the TY2016 forecast, historical expenditures for 2009 through 2013 were evaluated. To factor in periods of high operations work, as well as years with lower levels of activity, SDG&E chose a five-year (2009 through 2013) average spending method to forecast the base level of spending for TY2016. This approach allows SDG&E to capture historical spending under a variety of conditions that reflect the historical fluctuation in labor and non-labor expenditures associated with this workgroup. Added are incremental work elements not reflected in this base average necessary to fund the Asset Management – Pipeline O&M Planning activities in TY2016. These elements are described below.

The total funding required over the 2013 adjusted-recorded base including the incremental additions in this workgroup is $224,000 in TY2016.

This request will advance our ability to meet the requirements in SB 705 to "…[i]dentify and minimize hazards and systemic risks in order to minimize accidents, explosion, fires, and

dangerous conditions, and protect the public and the gas corporation workforce" and "[i]dentify the safety-related systems that will be deployed to minimize hazards, including adequate documentation of the commission-regulated gas pipeline facility history and capability."[11]

i. Mapping and GIS Group Restructuring

Projects requiring mapping and records work include all new business activity, pipeline relocations, main extensions, pressure betterment projects, pipeline replacements, and various other operational activities that change the gas system configuration. Historically this work required creating a graphic representation of the facilities and collecting of pipe footage, material, design, and field paperwork into a hardcopy work order folder.

A recent change to the mapping organization involves the implementation of GIS and the retirement of the legacy mapping system. GIS is the system of record for Gas Distribution facilities, containing a graphical representation of the facility location and facility attributes. Up to 30 attributes are captured and catalogued into a GIS database for each mapped facility. Examples of recorded attributes include pipe diameter, material, installation year, installation work order, and maximum allowable operating pressure. As the GIS system is populated with key attributes, there is tremendous potential for quickly identifying facilities given an identified set of captured attributes. The employee skillset and education level required for maintaining, updating, and data mining the GIS database requires the restructuring of the workgroup into a workload management, GIS maintenance, and GIS analysis branches. Although no additional headcount is required, there is a labor cost differential associated with staffing qualified GIS specialists, technicians, and analysts. The total incremental funding needed for this workgroup is $75,000 over the forecast base for TY2016.

ii. Region Engineering Development Program

SDG&E operates a complex natural gas distribution system. To manage this system, SDG&E requires competent, knowledgeable engineers capable of handling many types of work such as network capacity analysis, pipeline facility design, construction inspection, and system master planning. The learning curve is steep because new engineers entering into the field must become adept at applying their engineering discipline. They must also be knowledgeable about the ever-increasing regulations that govern the natural gas industry, and they must know the Company's own internal policies and standards. Historically, these entry-level engineers in Gas

[11] Cal. Pub. Util. Code § 961(d)(1-2).

Distribution have been hired into specific positions where they learn one functional area on the job with some formal training. They stay in the position several years until opportunities become available in other areas of SDG&E. These new engineers are expected to make decisions about design criteria, work processes for different systems and functions within SDG&E, while only having limited experience and background in operations.

Normally, entry-level engineers are hired after a position has been vacated and the incumbent has moved to a new position, retired, or left SDG&E. This practice does not allow the parting experienced engineer to provide training and mentoring to the incoming engineer, causing the learning curve for the new engineer to be significant. To better prepare new engineers, SDG&E Gas Distribution plans to introduce an Engineering Development Program to move these new recruits through different parts of Gas Distribution, and provide them mentoring and a broader portfolio of engineering skills, thus accelerating their knowledge and understanding of operations. These individuals will be better prepared to make the safety-sensitive decisions that are required of them, which increases the value they bring to SDG&E, customers and the public.

In order to create this learning opportunity, two new part time engineering intern positions will be added. These intern positions will allow SDG&E to identify and develop talented individuals for the entry level positions as they become available. As interns complete the development program, the individuals will fill behind engineers moving into higher-level internal positions, leaving SDG&E Gas Distribution to seek other opportunities, or retiring. To implement this development and mentoring program, SDG&E forecasts an incremental increase of $52,000 over the base forecast in TY2016.

iii. Wireless Fees and Mounts for Mobile Tablets for Field Utility Specialists.

Field Utility Specialists will be equipped with Microsoft Windows-based tablet computers that can be utilized in the field environment. The tablet provides the Field Utility Specialists access to the GIS mapping system on the jobsite. This allows more efficient utility conflict checking, as well as field mapping support for emergency gas pipeline incidents. In order to utilize the full capability that the tablet has to offer, it must be able to be in constant communication with the company network. This will be accomplished through existing wireless networks in the service territory. Funding is required for vehicle mounts and wireless fees paid to commercial wireless retailers to provide service for tablets to remain on line. Remaining

online allows the Field Utility Specialist access to the Company's GIS gas mapping system. GIS is the system of record for pipeline location and attribute information necessary during construction to perform conflict checks, allow initial project planning and design research, and support field construction and customer service crews during emergency repairs and restoration.

a) Tablet Mounts for Field Utility Specialist Vehicles

A total of eighteen Field Utility Specialist vehicles will be equipped with wireless capable tablet computers. In 2014, a one-time cost of $32,000 will be incurred to install vehicle tablet mounts.

b) Wireless Fees for Field Utility Specialist Tablets

The annual funding requirement for wireless service fees for the eighteen tablet computers mounted in Field Utility Specialist vehicles represents an increase of $10,000 above the base forecast in TY2016.

iv. Addition of Field Utility Specialists

The Field Utility Specialists perform a wide variety of tasks in the planning office. This job is part survey specialist, part construction manager and part capital project designer. Aside from the design for Gas Distribution capital projects, the Field Utility Specialists will perform a survey to check for gas and electric infrastructure conflicts with municipal capital projects. If a conflict is found, the Field Utility Specialists will either negotiate a new alignment with the Municipality or will design a project to relocate the gas infrastructure. The Field Utility Specialists in this workgroup, will perform conflict checks for both gas and electric distribution infrastructure. If there is a conflict with the electric infrastructure, this information will be passed to the appropriate organization in the Company's Electric organization.

As the economy recovers,[12] the number of municipal infrastructure projects requiring a gas and electric infrastructure conflict check has steadily increased from 312 in 2009 to a forecast of 612 in 2014. This means that SDG&E expects to see an increase of 25% over the 2013 count of conflict checks of 484. In order to meet this increasing demand and the associated design relocation projects, the addition of two Field Utility Specialists is required.

Although the majority of the labor for the Field Utility Specialist is capitalized, a portion is O&M expense. The total O&M labor and non-labor expense for this increased staffing

[12] IHS Global Insight is used as a directional indicator for general economic conditions and potential economic growth.

represents an increase over the base forecast of $31,000 in TY2016. In addition, in order to perform the incremental work forecasted in this area, SDG&E is adding two incremental light duty trucks in 2015. The costs associated with these vehicles can be found in the prepared direct testimony of Carmen Herrera, Exhibit SDG&E-16.

v. High Pressure Pipeline Documentation Quality Control Added Positions

The Federal Register states that inaccurate pipeline records on a failed piece of pipe played a role in the San Bruno pipeline rupture.[13] This lead PHMSA and the National Transportation Safety Board (NTSB) to issue an Advisory Bulletin (AG-11-01) recommending that operators of gas pipelines verify that the records used to calculate maximum allowable operating pressure or maximum operating pressure for their pipelines are reliable and directing that these records "…should be traceable, verifiable and complete."[14]

SDG&E embarked on a new high pressure pipeline documentation system, which included but was not limited to verifying the material records for all high pressure pipeline materials installed, documenting the location of each component installed, verifying that the strength test parameters meet design specifications, and linking all this pipeline information to a pipeline document management system to ensure the establishment of a complete set of high pressure pipeline material and test records.

The increased record requirements for high pressure pipeline, pipelines that operate above 60 psig but do not operate at transmission levels (greater than 20% specified minimum yield strength) is significant. More than forty different documents or record types can be generated in order to pedigree the material to meet the "traceable, verifiable and complete" criteria. The documentation requirement in turn creates a significant increase in resource requirements. In order to accomplish this task, it was necessary to employ additional personnel specifically dedicated to the documentation effort who could develop a quality control system to manage this effort. A quality control effort dedicated to material control, construction inspection, and documentation minimizes the risk of utilizing incorrect construction procedures or the installation of unapproved materials in the gas pipeline system which could impact the integrity of the infrastructure and public safety. The additional staff requirements are a Quality Control Manager and a Material Expeditor.

[13] *See* Federal Register Vol. 76, No.6.
[14] *See* NTSB Advisory Bulletin ADB-11-01.

a) High Pressure Pipeline Quality Control Manager

The Quality Control Manager is responsible for the implementation and control of all quality-related documents associated with High Pressure Construction Projects. The Quality Control Manager verifies that all project related inspection activities have been thoroughly documented in accordance with the SDG&E Quality Control Manual and applicable Gas Standards. The Quality Control Manager is the central collection point for all High Pressure project related documents. The Quality Control Manager is responsible for creating the final project documentation package and assembles the documents for pipeline document management system electronic filing. Though the majority of the work performed by the Quality Control Manager will be capitalized, a portion is O&M costs. This represents an increase of $15,000 above the base forecast in TY2016.

b) High Pressure Pipeline Material Expeditor

The Material Expeditor is responsible for the functional execution of receiving, inspection, acceptance and issuance of material to the various high pressure pipeline jobs. The Material Expeditor is to perform these functions in accordance with SDG&E's applicable Gas Standards. In order to safeguard that the specified material ordered for each unique high-pressure job is not co-mingled with non-pedigreed material, it was necessary to establish a High Pressure Material Storage Yard. The Material Expeditor is responsible for the transfer, storage, and distribution of high pressure pipeline material and components and is the primary custodian of the High Pressure Material Storage Yard.

Though the majority of the work performed by the Material Expeditor will be capitalized, a portion is O&M costs. This represents an increase of $9,000 above the base forecast in TY2016.

c. Cost Drivers

As discussed above, Asset Management work is driven by the level of operations and maintenance activity in other workgroups covered in this testimony. As the economy improves, Field O&M Planning is experiencing an increase in general construction and customer-generated activity, which requires additional planning time. In additional, work in the public right-of-way requires the Technical Services offices to perform more planning work on pipeline relocations.

Regulatory agencies including the NTSB, PHMSA, and the Commission have recently directed pipeline operators to focus on the documentation of gas pipelines, including design,

construction, and pressure test records. To address this, SDG&E is adding high pressure pipeline quality control resources.

D. Operations Management and Training

Table FBA-15
San Diego Gas & Electric Company
Operations Management and Training

Shown in Thousands of 2013 Dollars			
D. Operations Management & Training	**2013 Adjusted-Recorded**	**TY2016 Estimated**	**Change**
1. Operations Management & Training	2,238	3,404	1,166
Total	**2,238**	**3,404**	**1,166**

1. Operations Management and Training

a. Description of Costs and Underlying Activities

Described in this section of testimony are activities representing leadership and operations support providing vision and guidance to the organization responsible for gas distribution. Within this workgroup are labor and non-labor expenses associated with: developing and maintaining distribution construction standards; evaluating new field technologies; assisting with field training; training distribution welders; providing code required welder testing; providing welding inspection; managing the Operator Qualification program, and managing the Welding School. Costs also include Gas Technical Services Miramar management and administrative and support positions. It includes the single cost center workgroup of Operations Management and Training.

b. Forecast Method

In projecting the future expense requirements for these functions, SDG&E reviewed the 2009 through 2013 historical spending for this entire workgroup. In general, operations leadership, field management, operations support, and personnel training increase as levels of work and workforce increase; as new programs, processes and technologies are implemented; and as regulatory or compliance requirements change.

The review of the historical costs in this work category shows a generally upward trend. Although, these historical pressures are anticipated to continue, SDG&E recognizes that efficiency gains can be driven in this area. In addition, significant incremental increases are

anticipated for this workgroup as described below. Therefore, as a foundational forecast, SDG&E used the 2013 adjusted recorded expense, which represents the base level of leadership, management, support, training personnel, and associated non-labor necessary to maintain current operations. Added to this base expenditure level are incremental additions necessary to adequately fund the activities in this workgroup in TY2016. The total funding required over the 2013 adjusted-recorded base including the incremental additions for the total Operations Management and Training workgroup is $1,166,000 in TY2016.

i. Expansion of the Operator Qualification Program

The Operator Qualification program at SDG&E will require an expansion of the existing program managed by SDG&E's centralized Gas Operations Training department. This expansion is driven by the changes in the Operator Qualification Program including:

- The addition of qualification elements and additional tasks within those elements - Currently there are 55 covered tasks, and each covered tasks consists of a written and a performance test (55 tasks X 2 tests = 110 tests). The Operator Qualification rule requires that the individual's knowledge, skills and abilities are demonstrated and tested for each task. The new program will expand from 55 to 125 tasks. This will require a consequent expansion in qualification training, test and evaluation administration and documentation for this significant increase in the number of tasks.
- An increase in the frequency for subsequent qualification in alignment with emerging industry leading practices - The subsequent qualification cycle is currently done every five years per employee. The industry standard is to be done every three years. Therefore, SDG&E is moving to a three-year cycle. A significant increase in the number of subsequent qualification tests and evaluations will result.
- Increased recordkeeping to record and track the program – The more than doubling of the number of tasks (from 55 to 125) will require a significant increase in employee qualification documentation and record keeping. An electronic record-keeping process will be implemented to bring the existing and expanded program from a manual record-keeping system to a fully electronic system in order to store, review and retrieve all the Operator Qualification records.
- Additional instructional designers, instructors, and qualification evaluators to support program expansion – The increase in number of tasks and increase in the frequency of

subsequent qualification, as described above, will require the addition of instructional designers to design the training modules, instructors to perform qualification training, and evaluators to verify through testing that the skills and knowledge of employees are acceptable and that they are qualified for specific tasks.

The following two items describe the required incremental activities.

a) Pipeline Inspection and Operator Qualification Evaluation Personnel Additions

To enhance pipeline safety, SDG&E embarked on a new high pressure pipeline documentation system that included, but was not limited to, verifying the material records for all high pressure pipeline materials installed, documenting the location of each component installed, and verifying that the strength test parameters meet design specifications. This represents an increase in the resources that were dedicated to pipeline documentation in the past. A portion of this resource impact, the initial resources required to develop the new documentation program, including the engineering, design, and material procurement and verification phase, is already included in the 2013 base. The field documentation quality and control, field material and pipeline as-built drawing development, and field welding and installation inspection portion is an incremental addition for the forecast years, which will require the addition of three Welding Inspectors—one charging to O&M and the other two charging to capital beginning in 2016.

Also included in this workgroup are labor and non-labor expense for two Operator Qualification Evaluators. As explained in the discussion above, the additional Operator Qualification evaluators are required for expanded employee testing to verify that the skills and knowledge of employees are acceptable and that they are qualified for specific tasks. In order to perform the incremental work forecasted in this area, SDG&E is adding one incremental light duty truck in 2016. The costs associated with this vehicle may be found in the prepared direct testimony of Carmen Herrera, Exhibit SDG&E-16.

The total incremental funding required for the additional Welding Inspector (charged to O&M) and the two Operator Qualification Evaluators in this workgroup is $300,000 over the forecast base for TY2016.

b) Operator Qualification Program Design and Training Personnel Additions

As described above for the expansion of the Operator Qualification program, the increase in the number of tasks and in the frequency of subsequent qualification will require the addition of three Instructional Designers to design the task training modules and two Operations Instructors to perform the expanded qualification training.

The total labor and non-labor incremental funding needed for this workgroup is $473,000 over the forecast base for TY2016.

ii. Annual Welding Training

Additional annual welding training and qualification will begin in 2014 and carry forward to train Company pipeline welders on a new welding process, which consists of a low-hydrogen welding procedure required to comply with recommended practices set forth in API 1104 Appendix B for in-service welding. Prior to 2013, this process was accomplished using only a small number of specialized welders from the pipeline welding Pre-Fabrication Shop. In order to increase the Company's flexibility in utilizing its welder workforce, and to accommodate increased workload, the SDG&E is taking action to qualify all the Company welders in this process. This will require that all SDG&E pipeline welders attend a six-week initial training class, plus a subsequent semi-annual requalification. A program including a total of six welders from a Company pool of 18 welders will be trained and/or re-tested on an annual basis. This annual training and testing will result in a $138,000 increase in expense reported to this workgroup over the base forecast for TY2016.

iii. Leak Survey and CP Quality Assurance Specialist

As governmental audits are becoming more stringent, SDG&E has found the need to collaborate with SoCalGas to implement a centralized Quality Assurance program. This program will perform audits for Leak Survey, Cathodic Protection, Pipeline Patrol, Bridge and Span inspections. The expanded audit workforce will allow the required field audits to be performed by this centralized group.

This approach provides the benefit of having the same core group of specialists performing all District audits. These Quality Assurance Specialists will bring consistency across the companies with respect to how these audits are performed, the elements that are being examined, and the follow-up corrective action that must be completed, documented, and verified. Additionally, a Centralized Audit function such as this is better equipped to identify trends,

provide direct employee training, and determine the effectiveness, and adequacy of the procedures used in normal operation and maintenance. This team will also be able to make recommendations to modify or enhance the policies and procedures when deficiencies are found. The Specialist will be able to perform the suite of audits mentioned above over a one-week period. This approach will enable Quality Assurance Audits to be completed bi-monthly at each District system-wide. This upward pressure results in a $100,000 increase in expense reported to this workgroup over the base forecast in TY2016.

iv. Compliance Assurance Technical Advisor

Over the last few years, SDG&E has implemented new field technologies to support operations processes. After the implementation of SAP as the work management tool, and Click as the work scheduling and order completion tool, SDG&E is now faced with the challenge of analyzing recorded inspection and repair data to verify accuracy and completeness of compliance data. Formerly, the information related to inspection and leak repair orders was documented on paper and mostly reviewed prior to entry into the legacy systems. With the implementation of SAP and Click, data is recorded automatically. Therefore the critical task of data validation must occur once the information is already in the system of record.

An incremental Technical Advisor will be needed to extract information from SAP and create comprehensive data validation tools to identify missing or incorrect information. This position will work directly with region personnel to retrieve the correct information and make the necessary changes in SAP. As trends are discovered with specific data issues, additional validation mechanisms will be implemented in Click to help reduce the number of errors discovered. This advisor will also assist in the preparation of reports for the annual CPUC audits and will support region management during audits and in responding to data requests.

This position, funded by the Distribution Integrity Management Program through 2015, has proven to be successful and will become part of routine operations in the future. The addition of this position will result in an increase of $100,000 in expense reported to this workgroup over the base forecast in TY2016.

v. Technical Services Assistant

As records of compliance work shift to a digital format, results from field inspections are able to be collected and analyzed at a more granular level. Consequently, the skills required of the staff that processes and maintains these records has shifted from primarily clerical to heavily

technical with an increasing demand on their ability to move through volumes of data. While the use of SAP-PM as the system-of-record allows for efficient query and follow-up by an experienced user, the time required to train an employee to fill this role has increased significantly.

Currently, SDG&E employs five Technical Service Assistants to cover each of the five Gas Operations desks, namely, Cathodic Protection, Meters and Regulators, Pipeline Operations, Leakage Mitigation, and the Gas Instrument Shop. Each Technical Service Assistant is sufficiently trained in his or her area, but does not possess adequate skills to fully cover another desk. Nor are Technical Service Assistants able to cover the most basic tasks of two desks for any length of time without incurring overtime. An additional lead Technical Service Assistant position is required to maintain a trained and available backup to cover an average of 27 weeks of vacation and sick time, as well as jury duty or other absences. A lead Technical Service Assistant is also required to provide additional support when non-routine tasks occur across all five desks such as annual CPUC and internal audits, by providing records and reports, and to serve as a subject matter expert.

In addition, the lead Technical Service Assistant will provide quality control for routine tasks, such as monitoring the status of work orders, verifying the completion of jobs, issuing follow-up notices for work to be done by personnel in and outside the department, and notifying supervisors of gas equipment or system emergency conditions where required. This approach will provide SDG&E with a viable option for maintaining continuity of compliance activities and record-keeping when any of the five impacted desks are temporarily or permanently vacated. The addition of the lead Technical Service Assistant will result in a $55,000 increase in expense reported to this workgroup over the base forecast for TY2016.

c. Cost Drivers

The forecast for the Operations Management and Training workgroup is driven by costs in four major areas, operations leadership, field management, operations support, and personnel training. In general, costs in these areas increase as levels of work and workforce increase; as new programs, processes and technologies are implemented; and as regulatory or compliance requirements change. As such, the work environment within Operations Management and Training is increasingly influenced by, and evolving with multiple drivers:

- Adoption of new, more stringent, regulations. As previously discussed, since the San Bruno incident in Northern California, SDG&E has experienced increased regulatory pressure to establish more strict compliance assurance mechanisms. This drives costs associated with the Quality Assurance program and a need for additional compliance technical advisors and assistants.
- The need to maintain a trained and qualified workforce. SDG&E is taking proactive action to address employee training and qualification through the expansion of its Operator Qualification program; additional instructors and subject matter experts; and improvements to its training facility.
- The need to support new field technologies and to facilitate the integration of these tools within the field and overall management practices. This drives costs associated with increased technical business support and identification and implementation of system enhancements.
- The need to maintain data integrity and leverage new information depositories. This drives costs associated with reports and tools that will gather, consolidate, and summarize newly available data to develop compliance reports and to monitor the effectiveness of operations and identify future business improvements.
- Increased workforce turnover. Workforce turnover presents issues of knowledge transfer, skills development, and overall proficiency of the replacement workforce. This drives costs related to training, Operator Qualification, technical support, and Quality Assurance.
- Introduction of new construction and maintenance methods into office and field functions. The introduction of new construction and maintenance methods drives costs associated with the personnel needed to revise Gas Standards and training materials, conduct refresher training, provide technical support, and conduct assessments and enhancements of business processes.

III. CAPITAL

A. Introduction

The driving philosophy behind SDG&E's capital investment plan is to provide safe, reliable delivery of natural gas to customers at reasonable cost. This commitment requires that SDG&E invests in its infrastructure and support services to mitigate risks associated with the safety of the public and employees; service reliability; and gas system integrity. SDG&E installs new pipeline mains, service lines and MSAs to meet the needs of the growing population in the service territory. To maintain system reliability and safety, SDG&E makes a variety of other capital improvements, including pressure betterment projects to improve areas of low pressure, pipeline renewals to replace deteriorated pipelines or obsolete equipment**,** installation and replacement of CP systems**,** and the purchase of electronic pressure monitoring devices for pressure tracking and monitoring. Other improvements include pipeline relocations to accommodate public infrastructure improvements such as street and highway widening, and relocations caused by the construction of new water, sewer, and railway facilities. To accomplish these activities, SDG&E continuously monitors the condition of approximately 14,600 miles of distribution main and service pipelines. By using technology and the professional judgment of experienced, skilled, and well-trained employees, SDG&E utilizes capital in the most prudent, responsible manner consistent with local, state, and federal codes and regulations.

In preparing the forecast for capital expenditures, SDG&E Gas Distribution reviewed historical spending levels, including work units, and developed an assessment of future requirements, and associated risks. This analysis entailed a review of the historical 2009 through 2013 spending, and consideration of the underlying cost drivers to determine if a historical pattern of spending should be expected to continue into the future, considering the mitigation of associated risks. Gas Distribution also evaluated future work requirements that were incremental to levels of historical spending and necessary to maintain the safe and reliable operations of the distribution system while mitigating risks. Thus, the forecasting methodologies varied depending on the type of activity being analyzed and the expectations of future system needs. These methods included forecasts of future spending based on historical averages; on historical growth and estimated future growth; on identified projects or materials; and a combination of project specific justification and analysis of historic spending. SDG&E's Gas Distribution

capital expenditure forecasts are rooted in a historical review of spending and adjusted, where appropriate, for elements of new work or changes in operating conditions and risk mitigation which would not have been reflected in the past spending patterns. As such this forecast addresses actions that must be taken to manage risks associated with the safety of the public and employees, service reliability, and gas system integrity.

To continue to provide safe and reliable service, while mitigating associated risks, SDG&E requests the Commission adopt forecast capital costs of $32,378,000, $37,363,000, and $40,971,000 for 2014, 2015 and 2016, respectively.

Table FBA-16 provides a summary of the total capital costs for the forecast years.

Table FBA-16
San Diego Gas & Electric Company
Capital Expenditures Summary of Costs

GAS DISTRIBUTION				
Shown in Thousands of 2013 Dollars				
Categories of Management	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
B. New Business	4,754	7,042	9,584	12,500
C. System Minor Additions, Relocations and Retirement	1,500	1,450	3,356	3,356
D. Meter and Regulator Materials	6,734	7,175	7,378	7,610
E. Pressure Betterment	1,247	2,304	2,304	2,304
F. Distribution Easements	26	28	28	28
G. Pipe Relocations - Franchise and Freeway	4,189	3,970	3,970	3,970
H. Tools and Equipment	236	1,865	1,871	1,955
I. Code Compliance	191	320	320	320
J. Replacement of Mains and Services	1,883	1,726	1,726	1,726
K. Cathodic Protection	911	899	953	967
L. Regulator Station Improvements and Other	133	1,256	737	463
M. Local Engineering	3,698	4,343	5,136	5,772
Total	**25,502**	**32,378**	**37,363**	**40,971**

The following sections provide, by activity, a description of the specific work to be completed, the benefits of such work, the forecast methodology, expected expenditures and cost drivers. These expenditures are necessary to maintain regulatory compliance and the continued safe and reliable delivery of natural gas.

In addition to this testimony, please also refer to my capital workpapers, Exhibit. SDG&E-04-CWP for additional information on the capital projects described here.

B. New Business (Budget Code 500)

Table FBA-17
San Diego Gas & Electric Company
New Business

GAS DISTRIBUTION				
Shown in Thousands of 2013 Dollars				
B. New Business	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. New Business	3,515	5,891	8,018	10,458
2. CIAC Collectible	1,239	1,151	1,566	2,042
Total	**4,754**	**7,042**	**9,584**	**12,500**

1. New Business

a. Description of Costs and Underlying Activities

The New Business Budget Code provides for changes and additions to the existing gas distribution system to connect new residential, commercial, and industrial customers. This includes installations of gas mains and services, MSAs, and the associated regulator stations necessary to provide service to the customer. The material cost of meters and regulators are addressed under Budget Code 502, in Section III.D (Meter and Regulator Materials).

These forecasted capital expenditures support the Company's goals of providing a safe and reliable gas distribution system and responding to its obligation to serve the growing customer base, thus mitigating the risk of reduced service reliability.

b. Forecast Method

The base forecast for New Business expenditures was developed using the projected new meter sets added to the gas distribution system. SDG&E forecasts an increase in the rate for meter installations. Table FBA-18 below shows the quantity of new meter sets SDG&E installed in the period 2009 through 2013 and the new meter installation forecasts for the years 2014 through 2016. For additional information describing customer meter set forecast methodology, please refer to the workpapers of SDG&E Customers witness Rose-Marie Payan, Exhibit SDG&E-32-WP.

Table FBA-18
San Diego Gas & Electric Company
New Business Meter Installation History and Forecast

Year	2009	2010	2011	2012	2013	2014F	2015F	2016F
Number of New Meter Set Installations	4,159	3,500	4,120	4,457	4,241	6,437	8,759	11,426

The expenditures for this budget code were forecasted by multiplying a five year average (2009 through 2013) adjusted recorded labor and non-labor cost per meter by the meter forecast quantities in years 2014, 2015, and 2016. The forecast of expenditures was separated into two components: the construction cost for labor and non-labor necessary to install new business additions, and the "collectable cost" or Contributions In Aid of Construction (CIAC) portion that supports these installations. The collectable cost of a project (or CIAC) is an amount of money collected from the customer that is applied toward the cost of construction for services rendered and/or facilities installed. The collectable costs for a project vary from project to project. Therefore, in order to forecast this fluctuating portion of new business expenditures, it is necessary to derive a factor that represents the average percentage of direct CIAC per direct construction costs. This factor was developed by dividing the annual direct CIAC credits collected by the total direct construction costs in a given year and averaged over the 2009 through 2013 time period. This factor was applied to the 2014 through 2016 forecast of construction costs, yielding the New Business Collectable component of the forecast.

Forecasted non-collectable expenditures for New Business in years 2014, 2015, and 2016 are $5,892,000, $8,018,000 and $10,458,000, respectively. The balance, or the forecasted collectable expenditures for New Business in years 2014, 2015, and 2016 are $1,151,000, $1,566,000 and $2,042,000, respectively.

c. Cost Drivers

New Business work is driven by the volume and type of new construction required to provide service to new residential, commercial and industrial customers, thus mitigating the risk of reduced service reliability and complying with the Company's obligation to serve. As described above, this includes the installation of new mains and services as well as "header" pipe (larger-diameter, medium-pressure pipe that can carry gas longer distances) to bring gas to new

developments. In some cases, it is also necessary to build high pressure supply lines and associated regulator stations.

In SDG&E's experience that new construction increases as the economy improves. SGD&E forecasts substantial new business growth in the next several years, and it is therefore reasonably anticipated that demand for construction resources and material will increase. The underlying cost drivers for this capital category relate to company labor, contractor services, third party services, paving services and materials such as pipe and fittings. All or a combination of these construction elements are necessary for performing New Business facility installations.

C. System Minor Additions, Relocations and Retirements (Budget Code 501)

Table FBA-19
San Diego Gas & Electric Company
System Additions, Relocations, Retirements

Shown in Thousands of 2013 Dollars				
C. System Minor Additions, Relocations and Retirement	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. System Minor Additions, Relocations and Retirement	1,080	1,039	1,039	1,039
2. CIAC Collectible	420	411	411	411
3. Non-Typical Project: line 49-28-D Relocation	0	0	1,906	1,906
Total	**1,500**	**1,450**	**3,356**	**3,356**

1. System Minor Additions, Relocations and Retirements

a. Description of Costs and Underlying Activities

This budget code captures expenditures not covered in other work categories that are required to maintain the continued integrity of SDG&E's gas distribution system. Examples of expenditures include gas distribution main and service additions, main and service abandonment, and main and service relocations due to customer requests or company requirements.

b. Forecast Method

In developing the forecast, historical expenditures for 2009 through 2013 were evaluated. Due to the wide range of activities recorded in this workgroup, as well as the cost fluctuations from year to year, a five year (2009 through 2013) average was selected as the best method to forecast future costs.

In order to develop a forecast for this budget code, the labor and non-labor components were evaluated separately. The labor component contains all the historical Company labor charges associated with construction projects within this budget category. A five-year average (2009 through 2013) was utilized as the forecasting methodology for this component.

Within non-labor, there are two distinct cost components: construction materials and services; and CIAC credits. The first non-labor component, materials and services, was forecasted using a five-year average (2009 through 2013). The second component, CIAC credits, was also calculated based on a five-year average (2009 through 2013). As previously discussed in the New Business Budget Code, the collectable cost portion of a project (or CIAC credits), is an amount of money collected from the customer that is applied toward the cost of construction for services rendered and/or facilities installed. Forecasted non-collectible base expenditures for Budget Code 501 in years 2014, 2015, and 2016 are $1,039,000 per year. The forecasted collectible expenditures for Budget Code 501 in years 2014, 2015, and 2016 are $411,000 per year.

Added to this five-year average base expenditure level are incremental additions representing new work elements, such as special projects or changes in capital operating conditions that would not be reflected in the past historical spending patterns but necessary to adequately fund this work category. Below is an explanation of the incremental requirements.

i. Line 49-28-D Relocation

Line 49-28-D is a high pressure lateral gas main that supports the Mt. Soledad area and the majority of the interior region of La Jolla. The main provides gas to approximately 5,838 customers in the area with no back-up-feed or redundant system. The placement of the main is located in a steep canyon with high brush and vegetation. Over the years, water run-off from the adjacent hillside resulted in eroded soils through the canyon, parallel to our gas main. To mitigate erosion adjacent to our pipeline, special bracing was installed at the bottom of the slope in the canyon. However, this measure did not add sufficient improvement to prevent further erosion.

Due to its proximity to eroded soils, steep slopes, high brush, and vegetation, the gas main presents challenges for our crews to perform routine regulatory required maintenance and inspections. The location of Line 49-28-D is difficult for crews to access via foot or by truck, and therefore requires extra labor and transportation costs for moving equipment necessary to

perform routine or emergency work. In addition, this high pressure pipeline also runs across the Rose Canyon earthquake fault. The access difficulty adds to the risk of maintaining system reliability as repairs during an emergency will incur delays, potentially leading to gas service outages. A more certain solution to eliminate the added obstacles of the location of Line 49-28-D, is to relocate the high pressure feed to continue supply of gas to the Mt. Soledad and La Jolla area.

The relocation of Line 49-28-D is limited in the selection of routes in the interest of avoiding historical landslide areas and underlying fault zones, as well as the limitation of existing high pressure main supply extensions. As a result, the new location for the high pressure main will connect to main Line 49-28 and extend approximately 15,000 feet of six-inch diameter steel and will include one regulator station. Due to the length of relocated main to be installed, a majority of this work will be performed by contract crews, spread over the period of two years in 2015 and 2016. This relocated route will allow for crews to perform maintenance with less difficulty, reduce the time required to access the main for inspection, maintenance and emergency response, eliminate high pressure gas lines along hazardous areas, as well as provide more reliable gas supply to the area. Forecasted expenditures for the Line 49-28-D Relocation project in years 2015 and 2016 are $1,906,000 per year.

c. Cost Drivers

The costs included in this budget code relate to expenditures not covered in other work categories that are required to maintain the continued integrity of SDG&E's gas distribution system. Costs are primarily driven by the volume and type of construction required to address the needs of property owners requesting SDG&E to move its facilities from their property; or to meet the Company's need for minor additions, facility relocations or abandonments to address conflicts, integrity or reliability concerns. Examples include the number of customer house-lines or gas service lines to be relocated and/or abandoned, which is generally driven by economic conditions.

The underlying cost drivers for this capital work category relate to Company labor, contractor service, third-party services, paving services, and materials, such as pipe and fittings. All or a combination of these construction elements are necessary for performing pipeline installations for this budget category.

D. Meter and Regulator Materials (Budget Code 502)

Table FBA-20
San Diego Gas & Electric Company
Meter and Regulator Materials

Shown in Thousands of 2013 Dollars				
D. Meter and Regulator Materials	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Meter and Regulator Materials	6,734	7,175	7,378	7,610
Total	**6,734**	**7,175**	**7,378**	**7,610**

1. Meter and Regulator Materials

a. Description of Costs and Underlying Activities

This budget code provides for the capital material expenses for purchasing new residential, commercial, and industrial gas meters and pressure regulators. Meters and regulators installed or replaced are grouped in three general categories:

- New business installations;
- Routine replacements; and
- Planned meter and regulator replacements.

These purchases, and the subsequent installations, are necessary for accurate billing, reliability, and safe operation. The expenditures included here are for the materials costs only. The associated installation expense is covered in other applicable budget categories (*e.g.* New Business capital and Code Compliance).

Meters and regulators are purchased for installation at new customers' premises. Purchases in this category are consistent with forecasts discussed in Section III.B (New Business) of this testimony.

A routine replacement is a reactive replacement of the meter resulting from either a Company- or customer-identified problem with meter accuracy or operation such as customer trouble calls, customer billing complaints, and replacements due to meter failures or damage. Routine meter changes have remained relatively constant from year to year. Small meter routine replacement labor is addressed in the prepared direct testimony of Sara Franke, Exhibit SDG&E-13.

Planned meter and regulator replacements are proactive replacements based on results of a statistical sampling of meter accuracy, age, and performance. These replacements are targeted

based on a program to achieve gas measurement accuracy. General Order 58-A requires that gas meters employed by SDG&E measure gas volume to a certain level of accuracy or be removed from service for repair or replacement. Meters are removed consistent with the Gas Meter Performance Control Program which is addressed in the prepared direct testimony of Sara Franke, Exhibit SDG&E-13.

As described in Section II. B (Field Operations and Maintenance) above, SDG&E is implementing a regulator internal parts replacement program. This program will proactively replace critical internal soft parts on an established maintenance schedule. In order to implement the program for all district regulator stations SDG&E will replace 97 non-state-of-the-art regulators that are difficult to source internal parts for or require extensive effort to replace critical internal components. These regulators have typically been in service for 30-40 years and are included in the 2014 regulator forecast quantities.

b. Forecast Method

Forecasted expenditures for meters and regulators are based on forecasted quantities for new business, the trending of usage for routine replacements, as well as planned meter replacements. The forecasted usage is multiplied by the current meter or regulator contract prices to estimate future expenditures. The forecasting methodology used to project the number of new business meters is provided in the workpapers of SDG&E's Gas Customer Growth Witness, Rose-Marie Payan, Exhibit SDG&E-32-WP. Small meter routine replacements and planned meter replacements are based in the information found in the prepared direct testimony of Sara Franke, Exhibit SDG&E-13.

Forecasted expenditures for Meter and Regulator Material in years 2014, 2015, and 2016 are $7,175,000, $7,378,000 and $7,610,000 respectively.

c. Cost Drivers

The main cost drivers for this capital work category consist of meeting projected new business requirements, routine meter replacements, and planned meter replacements. New business meter and regulator purchases in this category are consistent with installations discussed in Section III.B (New Business), and displayed in Table FBA-18. Meters purchased for routine replacements are in response to Company-or customer-identified problems due to meter accuracy, age, or operation. Planned meter replacements are meter families in the Gas Meter Performance Control Program that fail accuracy limits, based on meter statistical sampling.

E. Pressure Betterment (Budget Code 503)

Table FBA-21
San Diego Gas & Electric Company
Pressure Betterment

Shown in Thousands of 2013 Dollars				
E. Pressure Betterment	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Pressure Betterment	1,247	2,304	2,304	2,304
Total	**1,247**	**2,304**	**2,304**	**2,304**

1. Pressure Betterment

a. Description of Costs and Underlying Activities

Recorded in this budget code are expenditures for Gas Distribution pressure betterment projects performed on an on-going basis to maintain system reliability and service to all customers. Pressure betterment projects are performed in areas where there is insufficient capacity or pressure to meet load growth. Pressure Betterment projects are necessary to maintain reliable service to existing customers as new gas load is added to the gas distribution system.

Once a pipeline system is designed and installed, the capacity remains relatively fixed. However, as load increases from new business activities or from expansion of existing customer loads, over time the existing pressure decreases which reduce the available volume for new and existing customers. If the diminishing pressure is not addressed, gas service to customers could be interrupted.

To determine which areas need pressure betterment, growth information is gathered from customers, builders, and city, county, and state agencies. In addition, SDG&E collects data from pressure gauges and electronic pressure data recorders. This information is used to run model simulations on system flow and identify capacity constraints. Based on analysis of these constraints, region engineering personnel identify specific pressure betterment projects and the estimated year in which the project will need to be constructed. The projects are constantly reprioritized as the timelines for new developments change and economic conditions fluctuate. These projects typically involve installing new mains and, when necessary, regulator stations, or upgrading existing mains and regulator stations to a higher pressure.

Pressure betterment capital expenditures support the company's goals of providing safe, reliable service to customers, thus mitigating the risk of adverse impacts to system reliability.

This work category addresses critical areas of the distribution pipeline network that are most susceptible to pressure drops to alleviate the potential risk of loss of service to customers.

b. Forecast Method

SDG&E's gas infrastructure is a large dynamic system of pipelines and pipeline connections, with continual changes in customer load and construction activity. It is difficult to identify and estimate specific betterment projects more than a couple of years into the future so that the latest load and growth information is used. In addition, the timing to complete each project can be unpredictable due to the need for detailed planning requirements, acquiring the required permits, and coordination and scheduling of resources. Therefore, 2014 through 2016 expenditures are based on a historical five year average of recorded expenditures for the years 2009 through 2013. This average captures the yearly variations in system pressure betterment requirements which vary with constantly changing new construction development schedules, economic conditions, and large customer system impacts. Forecasted expenditures for Pressure Betterment in years 2014, 2015, and 2016 are $2,304,000 per year.

c. Cost Drivers

The main drivers for pressure betterment projects are the growth in gas load as a result of new customers and the increased gas usage of the existing customers. This work supports the Company's need to mitigate system reliability risk and to comply with the Company's obligation to serve. After years of customer growth, many systems operate close to their maximum capacity and additional gas load will create system constraints increasing the reliability risk and customer outages.

As previously discussed, a driver of new customer growth is economic conditions. Thus, as the economy continues to improve over the forecast period,[15] so will the need for pressure betterment improvements.

The underlying cost drivers for the Pressure Betterment capital budget code relate to company labor, contractor services, third party services, paving services and material cost. All or a combination of these construction elements are necessary for performing facility installations for pressure betterment.

[15] IHS Global Insight –Southern California non-farm employment growth rate is used as a directional indicator for general economic conditions and potential economic growth.

F. Distribution Easements (Budget Code 504)

Table FBA-22
San Diego Gas & Electric Company
Distribution Easements

Shown in Thousands of 2013 Dollars				
F. Distribution Easements	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Distribution Easements	26	28	28	28
Total	**26**	**28**	**28**	**28**

1. Distribution Easements

a. Description of Costs and Underlying Activities

This budget code provides funding to obtain gas distribution pipeline and facility easements on private property or public lands. Typical work performed includes completing survey and mapping functions, document research, document preparation, and negotiations for the acquisition of easements to allow for the installation of gas distribution facilities on private property or public lands.

b. Forecast Method

The forecast method developed for this cost category is a five year average based on 2009 through 2013 spending levels. This method is most appropriate due to the historic fluctuations in this budget category. Forecasted expenditures for Distribution Easements in years 2014, 2015, and 2016 are $28,000 in each year.

c. Cost Drivers

The cost driver for this capital budget category relate to the need to acquire easements for SDG&E facilities. Although SDG&E typically installs gas distribution facilities in city franchise locations this it is not always feasible, an example would be an easement through private property.

The underlying cost drivers for this capital work category relate to company labor, contractor services, and documentation fees. All or a combination of these elements are necessary for acquiring easements.

G. Pipeline Relocations - Franchise and Freeway (Budget Code 505)

Table FBA-23
San Diego Gas & Electric Company
Pipe Relocations - Franchise and Freeway

Shown in Thousands of 2013 Dollars				
G. Pipe Relocations - Franchise and Freeway	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Pipe Relocations - Franchise and Freeway	4,189	3,920	3,920	3,920
2. CIAC Collectible	0	50	50	50
Total	**4,189**	**3,970**	**3,970**	**3,970**

1. Pipeline Relocations – Franchise and Freeway

a. Description of Costs and Underlying Activities

The Pipe Relocation-Franchise and Freeway budget code provides funding for the required relocation of existing gas facilities when necessitated by public improvements. Generally, the work involves a change in alignment or elevation of existing gas pipelines and associated facilities and is driven by local and state agency requirements. At the local level, SDG&E has franchise agreements that require the gas infrastructure to be moved if it conflicts with city and county projects. These agreements obligate SDG&E to perform this work.

The City of San Diego has been one of the largest drivers of funding required for this budget code. The level of relocation work driven by city projects has remained reasonably stable during the 2009 through 2013 timeframe. In addition to the City of San Diego's projects, SDG&E serves 17 additional cities and one county within its service territory that also impact this budget code with relocation projects. Future improvement projects from these municipalities will continue to contribute to the expenditures in this capital account.

These forecasted capital expenditures support the requirement to comply with the provisions of applicable third-party utility agreements.

b. Forecast Method

The timing and the number of franchise pipeline projects is driven by outside agencies therefore, expenditures in this budget category are dependent on the number, extent, and timing of these requests, and are largely outside of the Company's control. However, when projects do occur, SDG&E must complete its portion of the work while minimizing schedule delays for the agencies involved. Therefore, forecasted expenditures are based on a historical average of

recorded expenditures for the years 2009 through 2013. This average captures the yearly variations in franchise and freeway relocation requirements as economic conditions and city, and Caltrans (California Department of Transportation) funding vary.

The forecast of expenditures were separated into two components: the construction cost from labor and non-labor necessary to construct the freeway and franchise projects, and the CIAC portion that supports these installations. In order to forecast this fluctuating portion of the expenditures, it was necessary to derive a factor that represented the average percentage of direct CIAC per direct construction costs. This factor was developed by dividing the annual direct CIAC credits collected by the total direct construction costs in a given year and averaged over the 2009 through 2013 time period. This factor was applied to the 2014 through 2016 forecast of construction costs yielding the Freeway Franchise collectable component of the forecast. Forecasted non-collectable expenditures for Freeway and Franchise in years 2014, 2015, and 2016 are $3,920,000 per year. Forecasted collectable expenditures for Freeway Franchise in years 2014, 2015, and 2016 are $50,000 per year.

c. Cost Drivers

As previously discussed, franchise relocation projects are driven by the volume and type of construction required in response to the requests of the external agencies, such as the City and County of San Diego, and the California Department of Transportation. These agencies submit requests to relocate pipe that would in its current location, interfere with the planned construction or reconstruction of freeways and public roads. The work in this budget category includes expenditures associated with SDG&E's requirement to comply with the provisions of its utility agreements. The degree of complexity of each relocation request varies, and often the outside agency's construction schedules often change which have a direct impact on SDG&E's costs.

The underlying cost driver for this capital work category relate to company labor, contractor services, third party services, paving services, and materials such as pipe and fittings. All or a combination of these construction elements are necessary for performing franchise and freeway relocation projects for mains, services, and associated facilities.

H. Tools and Equipment (Budget Code 506)

Table FBA-24
San Diego Gas & Electric Company
Tools and Equipment

Shown in Thousands of 2013 Dollars				
H. Tools and Equipment	**2013 Adj. Recorded**[16]	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Tools and Equipment	236	421	675	421
2. Non-Typical Project: Skills Training Facility	0	1,444	925	0
3. Non-Typical Project: Weld School	0	0	271	1,534
Total	**236**	**1,865**	**1,871**	**1,955**

1. Tools and Equipment

a. Description of Costs and Underlying Activities

This budget code captures expenditures for new tools and equipment required by field personnel to construct, operate, and maintain the gas distribution system. New tools and equipment are replaced due to failure, age, and advances in technology. In addition, SDG&E invests in new tools that provide innovative ways of completing the maintenance and repair of its facilities in order to lessen customer disruptions, improve pipeline facility documentation, improve gas system safety, and improve employee safety.

b. Forecast Method

In developing the forecast, historical expenditures for 2009 through 2013 were evaluated and a non-typical project costs for the Skills Training Facility were excluded from adjusted recorded history as they are not representative of the historical activity pattern. The need for new tools and equipment is somewhat unpredictable and influenced by technology, ergonomics, and changes in company gas standards or procedures. Due to the cost fluctuations from year to year, a five year (2009-2013) adjusted recorded average was selected to forecast future base costs. The forecasted expenditures based on the 5-year average for tools in years 2014, 2015, and 2016 are $422,000 per year.

[16] Historical costs related to the Skills Training Facility were removed from the routine tools and equipment, in order to calculate the routine forecast. See the capital workpapers, Exhibit SDG&E-04-CWP, for more details.

Added to this five year average base expenditure level are incremental tools and equipment additions necessary to adequately fund equipment and tools during the forecast period. Below is an explanation of the incremental requirements.

i. Equipment for Mueller Pressure Control Truck

As discussed in Section II. B (Measurement and Regulation) above, pipeline tapping and plugging machines are used to perform maintenance and construction operations safely and cost effectively on active gas mains. These devices allow uninterrupted service to be preserved while the gas infrastructure is being maintained, relocated or expanded. The tapping and plugging machines and associated miscellaneous equipment are transported in a specialized heavy duty vehicle based on the International 4400 chassis featuring a hydraulic crane, air compressor, and storage cabinets.

The pressure control truck is utilized for tapping and plugging operations on three-inch diameter and larger steel gas mains. Currently SDG&E operates one of these specialized vehicles and is limited in the number of tapping and pressure control work performed in a single day. As with any vehicle, there are routine maintenance requirements and occasional breakdowns of the vehicle itself or specialized equipment onboard such as a hydraulic crane and air compressor. When the vehicle is not in working condition, SDG&E is limited in its ability to perform tapping and pressure control operations for routine and emergency work, and must temporarily transfer critical equipment to a smaller vehicle, a labor and time intensive undertaking.

SDG&E will therefore outfit a second International 4400 pressure control and tapping vehicle to allow for more than one pressure control job to be scheduled in a given day and to augment emergency response capabilities for incidents/projects that require this equipment. In addition to the vehicle and small tools expenses covered in Section II. B (Measurement and Regulation), a one-time expense of $255,000 will occur in 2015 over the forecasted base to outfit the vehicle with Mueller pressure control equipment.

ii. Skills Training Facility

This budget code includes incremental expenses for the completion of construction of a training facility for gas distribution operations personnel at the present Skills Training center. Funding this Skills Training Facility will improve safety by enhancing hands-on training. The training facility will have demonstration installations of common gas facilities (vaults, regulator stations, CP stations, etc.) where routine and emergency scenarios can be simulated. The

training facility will support the instruction of new personnel in field operation tasks as well as supplement incumbent personnel's training in leading practices specific to gas operations. Operating organizations that will be able to train at this new facility on skills such as cathodic protection, locate and mark, leak detection, and distribution operations. The facility will provide a hands-on training ground where knowledge can be gained in job specific training sessions that can be safely taught in a controlled, real world simulated environment. The estimated incremental project costs are $1,443,000, and $924,000 for years 2014 and 2015, respectively.

iii. Welding School Facility Upgrade

This budget code includes incremental expenses for the completion of the welding school facility upgrade at Miramar base. With the increase in the amount of activity dedicated to welder training, and welder certification requirements to meet our expanding Operator Qualification Program, the school is in need of an upgrade to the facilities, equipment, materials and technology.

The school requires both classroom and hands-on training to cover all the elements of welding processes, procedures, and safety procedures required to produce new qualified welders and to re-qualify existing welders. This includes reviewing code compliance and safety practices (including abnormal operating conditions), knowledge and performance testing of required field welding and safety skills, and simulation of conditions found in the field.

In addition, the school must provide an adequate area for storage of the materials required to train, test and qualify welders. Materials include lengths of various sized pipe, fittings, welding rod, clamps, etc. Also required, is an area dedicated for destructive test equipment necessary to test weld samples for evaluation of welder performance and compliance to procedures. The existing facilities as they are structured currently at the Miramar school do not have the capacity to accomplish the principal training and evaluation elements for the expansion of the Operator Qualification program requiring more welder tasks to be evaluated in addition to incremental number of qualified welders required for the additional pipeline welding projects.

The principal improvement goals for the upgrade to the Welding School at Miramar are to:

- Improve employee safety;
- Provide adequate space for classroom elements of welder training and Operator Qualification;

- Improve welding training equipment to closely match field welding equipment;
- Improve environmental conditions (air quality, lighting);
- Provide improved area to stimulate field welding conditions;
- Improve ergonomics (stands, tables, work stations);
- Improve welder qualification testing equipment area; and
- Provide adequate storage space for welder training materials.

The upgrades in the school can be accomplished cost effectively by upgrading the existing school at Miramar rather than building a new school at the Skills Training Center from the ground up. The estimated incremental project costs are $271,000 and $1,533,000 in years 2015 and 2016, respectively.

c. Cost Drivers

The main driver for capital tools and equipment purchases is the need to continuously equip SDG&E's employees with safe and reliable tools and equipment. As previously discussed, SDG&E's tools and equipment are exposed to rigorous environments which impact their useful life. Many of the tools and equipment being utilized in the field and training facilities contain sensitive components that are subject to shock, vibration, rain and dusty conditions which are factors that contribute to the deterioration of the equipment. Furthermore, work increases in other Capital and O&M work categories increase the need for personnel and therefore the tools they use to perform their job.

The underlying cost drivers for this capital work category includes expenditures associated with the purchase of capital tools and equipment used by the distribution field personnel for the maintenance and repair of gas pipeline systems. The main drivers for Tools and Equipment capital budget code is the need to replace existing tools due to condition, failure, age, advances in technology, and to improve safety and ergonomics. In addition, SDG&E invests in new tools that provide innovative ways of completing the maintenance and repair of its facilities in order to lessen customer disruptions, improve pipeline facility documentation, improve gas system safety, and improve employee safety.

I. Code Compliance (Budget Code 507)

Table FBA-25
San Diego Gas & Electric Company
Code Compliance

Shown in Thousands of 2013 Dollars				
I. Code Compliance	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Code Compliance	191	320	320	320
Total	**191**	**320**	**320**	**320**

1. Code Compliance

a. Description of Costs and Underlying Activities

This budget code provides funds for upgrades or additions to facilities to ensure compliance with minimum federal safety standards for gas pipelines, 49 CFR 192 and General Order 112-E.

The four main areas that comprise the expenditures represented by this budget code include the following:

- Labor for the Regulator Replacement Program for pre-1982 American Meter Type K-Regulators to be removed in compliance with 49 CFR 192.197(b);
- Labor and materials necessary for the installation of barricades to protect MSAs from vehicular traffic in compliance with 49 CFR 192.353(a);
- Labor and materials necessary for the installation of distribution system electronic pressure monitoring devices in compliance with 49 CFR 192.741(a)-(b); and
- Isolation valves necessary for safe operation of the gas distribution system in compliance with 49 CFR 192.747.

The four main expenditure components for Budget Code 507 are described in more detail below:

i. <u>Regulator Replacement Program</u>

As previously discussed in the Meter and Regulator Materials Budget Code (BC 502), since 1983, SDG&E has been installing regulators that contain an over pressure protection feature. This feature ensures that, when the regulator senses pressure building within the customer's houseline (i.e. should the pressure level coming out of the regulator increase beyond acceptable levels), it will release the excess pressure through a vent while maintaining an

acceptable level of houseline pressure. Regulators installed prior to 1983 did not generally possess this feature. In an effort to minimize inconvenience to customers, SDG&E currently replaces these regulators when an employee is on a customer's premises to change the gas meter or when a gas service has been isolated for house pest fumigation as scheduled by the pest control company. The labor cost associated with these regulator replacements are accounted for within this budget code in the historical expenditures. The cost of the regulator material is included in the Meter and Regulator Materials Budget Code (BC 502).

ii. Barricades to Protect MSAs

Another contribution to this budget code's expenditures is the installation of barricades to protect meter sets from vehicular damage. Barricades are installed to protect the MSA from vehicular traffic at existing customer locations in accordance with 49 CFR 192.353(a) and General Order 112-E. The installation of meter barricades creates a more secure environment at the MSA location, which in addition to increasing public safety, results in increased longevity and performance of the MSA equipment. Furthermore, the increased growth in the SDG&E service territory brings increased population density, creating a higher probability for conflicts with vehicular traffic at MSA locations. Recent trends in architecture to maximize saleable square footage have resulted in less room for MSAs, increasing the demand for meter barricades to ensure MSAs are protected.

iii. Isolation Valve Installations

The distribution system continues to grow with the installation of gas mains due to new business. With this comes the need for installation of isolation valves for emergency response or safe operation of the system. Frequently these valves are installed with the installation of the new business main. However, due to the complexity of the vast network of interconnected gas mains, it is necessary to periodically evaluate the system to ensure there are adequate valve installations to provide for proper system isolation. If a valve is identified through this process to be necessary for safe operation of a distribution system, a valve is installed and expenditures accounted for within this budget code.

iv. Electronic Pressure Monitors

Expenditures are included in this budget code for the installation of electronic pressure monitoring devices in the service territory. Electronic pressure monitors are used by SDG&E to remotely monitor distribution pipeline pressures in support of gas system capacity analysis and

as a warning system to communicate pipeline system gas pressures that may be outside of normal limits. The primary purpose of the electronic pressure monitor network is system safety and compliance with 49 CFR 192.741. In addition to the purchase of new electronic pressure monitoring devices for scheduled installations, as the number of electronic monitors in the system grows, SDG&E will need to establish an appropriate shelf inventory of electronic pressure monitors to be readily available for replacement of failed or damaged units.

b. Forecast Method

The historical expenditures were evaluated separately for each of the four principal budget components listed above. Due to the fluctuating expenses between the four principal components the forecast methodology for this budget code is a four year average. A five year average would have included a non-typical one-time expense for 100 electronic pressure monitors resulting in an overstated forecast. The overall expense in this budget category has recently decreased, however SDG&E is forecasting an increase in the Regulator Replacement Program and electronic pressure monitor installations beginning in 2014 as system electronic pressure monitoring coverage is being re-evaluated. Forecasted expenditures for Code Compliance in years 2014, 2015, and 2016 are $320,000 per year.

c. Cost Drivers

The Code Compliance budget code is driven by costs associated with each of its principal work components. The main drivers for electronic pressure monitor installations are the need to provide coverage at sites where system pressure is under monitored; and the need to replace existing electronic pressure monitors due to electronic component malfunctions. Meter guard installation work is driven by conditions surrounding the location of an existing meter set assembly. Meter guards are installed to protect the MSA when it is apparent that activity on the property creates or encourages a potentially hazardous environment to the MSA. The driver for Replacing Type-K regulators is the number found while employees perform other work at the MSA. The driver for isolation valves is the number for emergency response of safe operation of the system.

The underlying cost drivers for this capital work category relate to company labor, contractor services, third party services, paving services, and materials such as pipe and fittings. All or a combination of these construction elements are necessary for performing upgrades or

additions to facilities to ensure compliance with minimum federal safety standards for gas pipelines.

J. Replacement of Mains and Services (Budget Code 508)

Table FBA-26
San Diego Gas & Electric Company
Replacement of Mains and Services

Shown in Thousands of 2013 Dollars				
J. Replacement of Mains and Services	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Replacement of Mains and Services	1,883	1,726	1,726	1,726
Total	**1,883**	**1,726**	**1,726**	**1,726**

1. Replacement of Mains and Services

a. Description of Costs and Underlying Activities

Funding in this budget code is required to address compliance requirements for the elimination of potentially hazardous conditions due to leaking or deteriorated gas pipelines. This budget code provides for the replacement of deteriorated gas distribution system pipelines to maintain public safety and system reliability. Expenditures in this budget code range from minor pipe replacements to more complex projects. Most minor projects are completed in association with leak investigation and repair work. Other more extensive projects are scheduled as planned replacements based on evaluation of criteria such as observed condition of the pipe, coating deterioration, leak history, age of the pipe, construction methods originally used, and location relative to places of gathering. When the pipe condition is found to be hazardous or the pipeline has conditions similar to pipelines with a history of failures, the field and technical staff determines replacement options.

The forecasted capital expenditures support the company's goals of maintaining system integrity and reliability, thus mitigating safety and loss of service risks. Additional main replacement funding required in response to federal DIMP regulations is addressed in the prepared direct testimony of Maria Martinez, Exhibit SDG&E-07.

b. Forecast Method

In developing the main and services replacements forecast, historical expenditures for 2009 through 2013 were evaluated. Spending in this budget category has fluctuated over this period due to the variation in the number of identified main replacement projects. Furthermore,

the timing of individual projects is based on a number of factors including the need for review of operating conditions, detailed planning requirements, acquiring the required permits, risk assessment, and coordination and scheduling of resources. Therefore, the forecast of 2014 through 2016 capital expenditures is based on the five year average 2009 through 2013 historical spending pattern. This forecast methodology used best represents the cyclical volume of work qualified on an annual basis and captures the various challenges encountered during the construction of main replacements as well as this work category's dependency on the condition of the pipe as observed during maintenance activities.

Other forecast methods considered included the five year trend (2009 through 2013) and the 2013 base year. Both of these options result in a higher base forecast than the five-year (2009 through 2013) average. Given the degree of variability observed in the historical expenses for this work category, however, SDG&E selected the more conservative five-year average approach. Forecasted expenditures for Replacement of Mains and Services in years 2014, 2015, and 2016 are $1,726,000 per year.

c. Cost Drivers

The primary cost drivers in this category are the number of leak indications that can impact the integrity of the pipe leading to pipeline repairs and replacements. Other drivers include compliance with cathodic protection requirements; the deterioration of pipe material, pipe wrap, or coating; if the main is found to have active corrosion; if the pipeline is in a location in relation to population density where a failure presents a potential risk to public safety; unfit for service due to manufacturing or other defects; construction methods originally used; and location relative to places of gathering. The underlying cost drivers for this capital work category relate to company labor, contractor services, third party services, paving services and material cost. All or a combination of these construction elements are necessary for performing pipeline installations for main replacement work.

K. Cathodic Protection (Budget Code 509)

Table FBA-27
San Diego Gas & Electric Company
Cathodic Protection

Shown in Thousands of 2013 Dollars				
K. Cathodic Protection	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Cathodic Protection	665	586	600	614
2. Cathodic Protection System Enhancement	246	313	353	353
Total	**911**	**899**	**953**	**967**

1. Cathodic Protection; and Cathodic Protection System Enhancement

a. Description of Costs and Underlying Activities

The Cathodic Protection budget code includes expenditures associated with the installation of new and replacement CP systems and equipment in accordance with state and federal pipeline corrosion control standards (49 CFR 192, Subpart I–Requirements for Corrosion Control and General Order 112-E). Examples include the installation of impressed current stations, deep well anode beds, magnesium anode systems, and the purchase of CP instrumentation and monitoring equipment.

Buried steel pipelines, not well protected, will corrode and revert back to their natural state as iron oxide without proper intervention. Corrosion on pipelines increases the risk for leaks and may reduce the useful lives of the pipelines. In addition to the application of coating and electrical isolation, CP is one method for mitigating external corrosion on steel pipelines. CP combats corrosion by imposing an electric current flow toward the surface of the pipeline, which keeps the pipeline negatively charged (cathodic) with respect to the surrounding soil. This results in reduced corrosion on the pipeline system.

The CP System Enhancement budget code tracks projects specifically associated with creating dedicated high-pressure and medium-pressure distribution pipeline CP systems. Currently SDG&E CP station coverage areas often include a mixture of high pressure and distribution pressure pipelines. Typically, CP systems protecting distribution pressure pipelines are more susceptible to shorts compromising CP protection levels. SDG&E has embarked on creating dedicated CP systems for high pressure pipelines where any adverse consequences due to corrosion pose a higher risk.

CP system shorts and current interference typically occur as SDG&E's pipeline components come into contact with water lines or with third party grounding systems that can drain current from the pipeline; or near customer meter set assemblies and risers, from improperly grounded customer owned electrical systems and dog or bicycle chains wrapped around risers and meter sets. Thus, reducing the level of protection and depleting anodes. SDG&E continues to identify necessary modifications to CP systems to accomplish this effort. Associated work includes the installation of insulating unions separating CP systems, new rectifiers, anode beds and test points allowing the CP technician to take CP reads.

These forecasted capital expenditures support the Company's goal of preserving the integrity of steel pipelines by protecting them from external corrosion, thus supporting the mitigation of risks associated with infrastructure integrity, system reliability and public safety.

b. Forecast Method

SDG&E has approximately 3,600 miles of steel main and approximately 273,184 steel services that are cathodically protected. Expenditures in this work category are associated with new installation and replacement of major CP components and equipment to maintain the integrity of the CP system on these mains and services. Furthermore, expenditures in the Cathodic Protection budget code continue to steadily increase, but can have the tendency to fluctuate as well depending on the health of surrounding CP stations, soil conditions, and effective resolution of system shorts. The piping infrastructure continues to age, permitting fees are increasing, drilling prices have increased, and the need for new or renewed CP stations continues to rise. To account for the cost fluctuations from year to year, a five year (2009 through 2013) adjusted recorded average was selected to forecast future base costs. The forecasted expenditures based on the five-year historical average for the Cathodic Protection Budget Code, 509, in years 2014, 2015, and 2016, are $558,000 per year.

Added to this five-year average expenditure base level are incremental additions necessary to adequately fund the CP operation over the forecast period. Below is an explanation of the incremental requirements.

i. <u>Anode Bed Depth</u>

Historically SDG&E installed the majority of CP station sacrificial anodes at a depth of 150 feet. Typically, if an anode can be installed deeper, better CP coverage is achieved when compared to a shallow bed anode. While an efficient CP system depends on a variety of factors,

ground to anode resistance tends to decrease when anodes are installed deep below any high resistance layers of rock and soil types. Based on industry leading practices, anode beds installed at a 300-foot depth will in most cases provide better CP system coverage than the current 150-foot depth. Where practical, SDG&E will begin to drill deeper anode beds. The forecasted expenditures for the additional drilling footage in years 2014, 2015, and 2016 are $27,000, $41,000, and $54,000, respectively.

ii. Cathodic Protection System Enhancement

The Cathodic Protection System Enhancement Budget Code 12551 was created in 2012 to track projects specifically dedicated to separating high pressure and medium pressure CP systems. Since the inception of this budget code, SDG&E has identified an increasing number of areas that are in need of dedicated CP systems. This effort to create isolated high pressure and distribution pressure pipeline CP systems is a long term effort. The forecast method for this budget category is zero based, derived from a project list currently identified for construction in 2014, 2015, and 2016. Anticipated expenditures for this activity for years 2014, 2015, and 2016 are expected to be $313,000, $353,000 and $353,000, respectively.

c. Cost Drivers

As previously discussed, the main driver for Cathodic Protection work is compliance with DOT Regulation 49 CFR 192, Subpart I, and CPUC General Order 112-E, which set forth the standards for corrosion control as well as the need to safeguard the integrity of the pipeline system thus mitigating risks associated with infrastructure integrity, system reliability and public safety.

The age of the CP system component is also an important cost driver for this work category. As the system components age, their effectiveness decreases, driving the need for additional replacement work. Another work driver is the rate at which anodes deplete, which is impacted by a number of factors including soil moisture and type, electric current interference, customer actions, and pipe coating effectiveness. An additional driver is the need to protect the distribution pipeline system by having dedicated, separate CP systems for high pressure pipelines and distribution pipelines.

The underlying cost driver for this capital work category relate to company labor, contractor services, third party services, paving services, and materials. This includes new rectifier (impressed current) sites along with associated anode installations including the

necessary CP instrumentation and remote monitoring equipment; anode bed well replacements for existing rectifier systems; as well as installation of surface bed magnesium anode systems. All or a combination of these construction elements are necessary for cathodic protection projects and to maintain the integrity of the pipeline system.

L. Regulator Station Improvements and Other (Budget Code 510)

Table FBA-28
San Diego Gas & Electric Company
Regulator Station Improvements and Other

Shown in Thousands of 2013 Dollars				
L. Regulator Station Improvements and Other	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Regulator Station Improvements and Other	133	1,256	737	463
Total	**133**	**1,256**	**737**	**463**

1. Regulator Station Improvements and Other

a. Description of Costs and Underlying Activities

The Regulator Station Improvements and Other budget code provides funding for small capital projects (not captured under other budget codes) that improve safety, provide required code compliance, and improve gas system performance or reliability through the replacement of aging gas pipeline system operating equipment. Projects completed under this budget code typically involve upgrades to distribution piping associated with regulator stations, relocating regulator stations out of traffic due to growth and other safety improvements to gas distribution facilities. Regulator Stations are critical components of control equipment on the SDG&E pipeline network that support the mitigation of risks associated with infrastructure integrity, system reliability and public safety.

Regulator stations, consisting of valves and regulators, reduce and control the pressure of the gas entering the distribution system from higher pressure pipelines to provide the lower pressures used on the distribution pipeline network. Failure of a regulator station could over-pressure or shut down the gas distribution system which may impact customer service or public safety. SDG&E currently operates and maintains approximately 485 regulator stations and installs or replaces approximately three stations annually. SDG&E will continue its current practice of replacing deteriorating stations before operations and safety issues arise. These

forecasted capital expenditures support the company's goals of maintaining the safety, integrity and reliability of the system.

b. Forecast Method

Capital expenditures for this budget code were estimated on a zero base basis, since the five-year historical expenditures from 2009 through 2013 was not representative of future expenditures based on a pre-determined list of new projects or similar projects as those sporadically captured in historical spending. The four main expenditure components for Budget Code 510 are described in more detail below:

i. Butterfly Valve MSA Replacements

General Order 58-A requires that gas meters employed by SDG&E measure gas volume to a certain level of accuracy or be removed from service for repair or replacement. In order to accomplish this for medium and large meters, SDG&E typically performs meter replacements every ten years. If replacement is not practical due to meter size, configuration, type, or customer operations impacts, the meter can potentially be tested in place, if it can be successfully isolated.

Through this routine work, SDG&E continues to identify meter set assemblies (MSAs) that are problematic in configuration, hindering the ability to effectively perform inspections or meter changes to maintain safe, reliable and accurate measurement of gas flow. This issue appears to be isolated to meter installations from the 1970s through 1990s, serving large commercial customers, and containing large rotary meters that were flanged between two butterfly valves. Butterfly valves were designed to maintain a seal against bi-directional pressure in a system designed for unidirectional flow. Complete shut off of gas is required to test the meter operation and accuracy, which can be difficult to obtain with butterfly valves, as they can leak gas by and cannot be greased to attain a complete seal. As it becomes necessary to replace the older, large rotary meters with smaller ones, the flanged spacing is reduced. Given that the flanges hold the butterfly valves in place, the reconfiguration would impact the positive shut off capability. If positive shut off of gas cannot be maintained while changing out the rotary meter, a customer outage would occur.

As these outdated MSAs are discovered through the ten-year routine inspection schedule, they will be replaced with newer rotary meters and ball valves in a configuration that allows for the ease of maintenance without disrupting service to the customer and while maintaining complete gas shut off at the valves. The change out of the MSAs associated with butterfly valves

began in 2013. Because this is a new activity, forecasted expenditures are based on the work completed in 2013, which resulted in a forecast spend of $109,000 per year.

ii. Regulator Station Replacements

SDG&E routinely identifies regulator station locations that have become increasingly difficult to access and maintain safely. These regulator stations are located in areas where traffic has increased over time and have become highly congested, making it dangerous for crews to access. There are also stations that require modification resulting from customer or franchise projects that caused the final grade to be higher than originally designed. Furthermore, it is potentially hazardous for the crews to climb down with the necessary equipment to perform maintenance inside the below grade vaults located in the path of vehicular traffic. A review of historical expenditures (2009 through 2013) revealed that one regulator station replacement was captured in historical spend for the year 2010. Therefore, using a historical average or trend would not be appropriate when factoring the forecasted known regulator station replacement projects. Anticipated expenditures for replacing regulator stations to a more suitable and safer location for the years 2014, 2015, and 2016 are expected to be $873,000, $300,000 and $218,000, respectively. This work is estimated to continue as economic conditions improve and franchise/freeway improvements follow.

iii. Strainer / Regulator Station Vaults

Strainers are an important component of the regulator station as it removes debris such as dirt, rust, iron oxide dust and other particulates from the gas flow. Strainers are placed upstream of regulators to protect internal parts from being damaged. Typical regulator station installations would include the strainer along with the regulators inside an easily accessible below grade vault. However, in a population of older-era regulator stations the strainers were installed outside of the vault and buried, making accessibility and maintenance of the strainers extremely difficult.

As Pipeline and Distribution Integrity Programs continue to evolve, more internal inspections utilizing smart pigs are being conducted. This inspection process can push some debris along the pipeline as the tool travels and potentially push the debris in a lateral source supplying gas to a regulator station serving a distribution system downstream. To protect the regulators from being damaged, the regulators stations must be re-fabricated to place the entire assembly, including the strainer, within the vault, making it accessible for maintenance. Based

on the list of stations scheduled for strainer/regulator station vault replacement, the projected expenditures for 2014, 2015 and 2016 are $109,000 $273,000 $109,000, respectively.

iv. Borrego LNG Facility

SDG&E operates an unmanned LNG facility in Borrego Springs, California. Built in 1968, the facility consists of two above-ground LNG tanks and is designed to serve natural gas to roughly 300 resident facilities within the mobile home park in which it is located. LNG is about 1/600th the volume of natural gas at standard temperature and pressure, making it much more cost-efficient to transport over long distances where pipelines do not exist. The temperature of the liquid LNG is raised to change the form to a gas for use by the customers. To maintain compliant with 49 CFR 193 – LNG Facilities Federal Safety Standards, OSHA Section 1910 Subpart A, and General Order 112-E, SDG&E hired a consulting engineering firm to perform an evaluation of the LNG facility design.

The existing facility was originally constructed with copper piping and bronze valves. It is recommended to replace copper pipe and bronze valves with stainless steel, as it has a much higher service temperature which allows it to withstand extreme temperatures that can occur during an emergency such as a fire. Also, there are four locations of underground copper piping that are not cathodically protected and it is recommended to relocate these pipes above ground. In addition to these upgrades, it is also recommended to install access platforms, egress steps and audible alarms.

The existing security system consists of outdated equipment for communication and monitoring such as dial-up phone lines, older motion detectors and cameras, all resulting in a delayed time to relay information between the operator and camera reaction. Due to the remote site location, the lack of network communication from control panels, it is recommended that upgrades are made to the security system which include installing a DSL modem, updated control panels, laser motion detection and higher resolution cameras. The forecasted expenditures for Borrego system upgrades in years 2014, 2015, and 2016 are, $165,000,$55,000 and $27,000, respectively.

c. Cost Drivers

Work activities within the Regulator Station Improvements budget category are driven by regulatory requirements as well as the need to safeguard the safety and integrity of the pipeline

system and mitigate risks associated with infrastructure integrity, system reliability and the safety of employees and the public.

Large butterfly valve MSA replacements are driven by the routine inspections. As a result of General Order 58-A, SDG&E continues to identify meter set assemblies (MSAs) problematic in the way that the set was originally installed, hindering the ability to effectively perform inspections or meter changes assuring safe, reliable and accurate measurement of gas flow.

Strainer and regulator station replacements are driven by several factors including the condition of the station, the need to support system reinforcement or growth, and the need to address aging infrastructure such as stations that have known maintenance, reliability or design obsolescence issues.

Another driver within this budget category includes the requirement that our LNG facility remains in compliance with 49 CFR 193 – LNG Facilities Federal Safety Standards, OSHA Section 1910 Subpart A, and General Order 112-E.

The underlying cost driver for this capital work category relate to company labor, contractor services, third party services, paving services, and materials such as controls, electronics, valves, pipe and fittings. All or a combination of these construction elements are necessary for performing regulator station improvements.

M. Local Engineering Pool (Budget Code 902)

Table FBA-29
San Diego Gas & Electric Company
Local Engineering Pool

Shown in Thousands of 2013 Dollars				
M. Local Engineering	**2013 Adj. Recorded**	**Estimated 2014**	**Estimated 2015**	**Estimated 2016**
1. Local Engineering	3,698	4,343	5,136	5,772
Total	**3,698**	**4,343**	**5,136**	**5,772**

1. Local Engineering

a. Description of Costs and Underlying Activities

The Local Engineering Pool work category provides the labor and non-labor funding for a broad range of services to support Gas Distribution field capital asset construction. This budget code represents the forecasted costs associated with the Gas Distribution Local

Engineering Pool. Certain costs are incurred by capital projects that originate from central activities which are subsequently distributed to those capital projects. These central activity costs are also called "pooled" or "indirect" costs. The distribution of these costs is based on a number of factors such as Company labor, contracted services, and Applicant installations. The mechanics of the distribution of indirect costs onto project direct costs, resulting in total project costs, is discussed in the testimony of Jesse Aragon, Exhibit SDG&E-27.

The source of capital indirect costs for the Local Engineering Pool is technical planning, project management, and engineering activities.

i. Technical Planning and Project Management

Technical planning refers to all activities that take place in the Region Technical and Project Management offices in support of a capital project. These support work activities include, but are not limited to, the following:

- Planning the Project – This includes conducting field visits to assess job site requirements; retrieving available drawings for the proposed site to determine construction options; coordination with customers, municipalities and government agencies; selecting material, job specifications and method of installation; developing traffic control procedures and obtaining the required permits.
- Producing Project Drawings – This includes completing drawings required to obtain construction permits that are used by SDG&E and contractor field crews for asset installation and documenting the project in SDG&E records. It also includes updating drawing information following project completion necessary for documenting accurate records in SDG&E's electronic and physical archives.
- Acquiring and Managing Third Party Services – Construction oversight for acquiring third-party services such as paving, steel plates and equipment. This is necessary to provide oversight of third-party services compliance with Company specifications.
- Estimating Work Order Cost – This includes providing work order cost estimates and cost analysis for each capital project.

ii. Engineering Activities

Included in this pool's expenditures is the work performed by local engineering personnel to perform gas network analysis, develop construction designs and pressure control

specifications and conduct assessments of construction impacts on the reliability of the gas distribution system.

Personnel in the Local Engineering budget code are critical to the success of capital projects as they handle tasks throughout the life cycle of a construction job. To prepare a project for field construction personnel from this work category initiate, plan, design, and schedule for field dispatch. Once the job is in field construction, field management oversees the field crews and is responsible for making filed decisions that are compliant with standards and policies. After the project has been field completed, there is the remaining task of reconciling the construction as-built information, which also involves the personnel in this work category. These forecasted capital expenditures support the company's goals of promoting public safety, and the integrity and reliability of the natural gas system.

b. Forecast Method

Collectively, the level of support activities in the Local Engineering pool can fluctuate with the level of capital construction activity. Generally, the greater the volume of construction activity, the larger the support costs. Because of this relationship, the forecast was developed by evaluating the Local Engineering pool's historic capital expenditures with respect to the total direct expenditure across all Gas Distribution capital budget codes except for the Meter and Regulator Materials (Budget Code 502) and the Tools and Equipment Budgets (Budget Code 506). This produced an annual relationship of the percentage of Local Engineering to total direct capital expenditures. The five-year (2009 through 2013) average of this historical ratio was then applied to the forecasted total capital expenditures (less those budget codes discussed above) to determine the 2014, 2015, and 2016 forecast for Local Engineering. Forecasted expenditures for Local Engineering in years 2014, 2015, and 2016 are $4,343,000, $5,136,000, and $5,772,000, respectively. In order to perform the incremental work forecasted in this area, SDG&E is adding two incremental light duty trucks in 2014, and one in 2016. The costs associated with these vehicles can be found in the prepared direct testimony of Carmen Herrera, Exhibit SDG&E-16.

c. Cost Drivers

As discussed above, collectively, the level of support activities for field capital support can fluctuate with the level of capital construction activity. Generally, the greater the volume of construction activity, the larger the support costs. The underlying cost drivers for this capital budget relate to the necessary capital project support personnel contributing to capital

construction. Given this relationship, the cost drivers impacting construction related or in other Gas Distribution budget codes, as described in the capital section in this testimony, will also impact the Local Engineering pool.

IV. CONCLUSION

My O&M and capital forecasts were carefully developed and scrutinized by my organization and represent a prudent level of funding for critical O&M activities and capital projects taking place during the forecast period.

SDG&E faces a number of challenges affecting both the physical operation of the pipeline system and cost management aspects of its business. Operations and maintenance requirements increase as the system expands; additional maintenance and replacement work is required to continue to maintain reliability of an aging infrastructure; agencies and regulatory bodies continue to impose operating conditions that increase the cost of doing business; and with this all employees must be trained and ready to respond. The forecast presented in this testimony reflects SDG&E's best judgment of work and the associated costs required to:

- Operate and maintain its gas distribution system in a manner that safeguards the safety of the public and employees.
- Construct new gas distribution facilities in accordance with the Company's obligation to serve and to maintain system reliability.
- Replace existing facilities that are experiencing deterioration to safeguard infrastructure integrity and public safety.
- Respond to customer and governmental agency requests to remain in compliance.

Gas Distribution requests the Commission adopt its TY2016 forecast of $21,692,000 for Gas Distribution O&M expenses. This is an increase of $3,309,000 over the 2013 adjusted recorded base. This increase is driven by increased agency regulations and requirements, improved economic conditions, system expansion, infrastructure renewal, field technical skills training and qualification, and integration and support of new technology.

In capital, SDG&E requests the Commission adopt its forecast of $32,378,000, $37,363,000 and $40,971,000, in 2014, 2015 and 2016, respectively. The primary factors influencing the capital forecast are anticipated increases in new business related activity and pipeline system renewal work.

These forecast expenditures support Gas Distribution's fundamental philosophy of maintaining operational excellence while providing safe, reliable delivery of gas energy at the reasonable cost to customers. The Commission should find this request reasonable in that:

- The activities are necessary to maintain the delivery of safe and reliable service that SDG&E has been providing customers for many years;
- The activities are consistent with laws, operational codes and standards established by local, state, and federal legislators and agencies;
- The activities respond to operations, maintenance, and construction needs associated with projected customer and system growth and demands of cities, counties, and state agencies under the Company's franchise agreements; and
- The forecast amounts are reasonable in light of historical spending and anticipated work increases.

SDG&E's TY2016 forecast is a reasonable estimate of future requirements and should be adopted by the Commission.

This concludes my prepared direct testimony.

V. WITNESS QUALIFICATIONS

My name is Frank Ayala. My business address is 701 N. Bullis Rd., Compton, California, 90221. I am employed by SoCalGas as Director of Gas Operations – Northwest Region. I am one of two Gas Operations region directors who are responsible for all distribution pipeline operations in SoCalGas including the safe and reliable delivery of gas energy through the distribution pipeline network and the overall management related to the operation, maintenance, installation, and replacement of the gas distribution system. I also direct a group that provides technical and financial support for gas distribution project management and construction activities. This includes gas distribution planning and system design; emergency preparedness; response and recovery; and the preparation and management of O&M and capital budgets.

I have been employed at SoCalGas since 1967, and have held a variety of operating and staff management positions in Human Resources, Public Affairs, Field Operations, and Gas Operations. I have worked in much of SoCalGas' service territory. In my previous position, I provided leadership to a team of professionals that provided services to SoCalGas and SDG&E operations organizations to support the safe and reliable delivery of natural gas; develop and implement gas standards and business process enhancements related to the operation, maintenance, planning, installation, and replacement of the gas distribution system; provide compliance assurance support; and provide technical skills training and employee operator qualification.

I received my Bachelor and Masters of Business Administration degrees from Pepperdine University. In addition to my corporate responsibilities, I am very active in the community. I am past Chairman of the Board of the Mexican American Opportunities Foundation, the largest Hispanic non-profit social services delivery organization in the United States. I was also a member of the University of California, Irvine Chief Executive Roundtable.

I have previously testified before the Commission.

APPENDIX A - Glossary of Acronyms

Bcf	Billion Cubic Feet
CFR	Code of Federal Regulations
CIAC	Contribution in Aid of Construction
CP	Cathodic Protection
CPUC	California Public Utilities Commission
DIMP	Distribution Integrity Management Program
DOT	United States Department of Transportation
GIS	Geographic Information System
LNG	liquefied natural gas
MDT	Mobile Data Terminal
MSA	Meter Set Assembly
NTSB	National Transportation Safety Board
O&M	operations and maintenance
PHMSA	Pipeline and Hazardous Materials Safety Administration
PSEP	Pipeline Safety Enhancement Plan
psi	pounds per square inch
SAP	Systems, Applications, and Products in Data Processing
SB	Senate Bill
SDG&E	San Diego Gas & Electric Company
SoCalGas	Southern California Gas Company
TY	Test Year