

**ORA DATA REQUEST**  
**ORA-SCG-DR-021-DAO**  
**SOCALGAS 2016 GRC – A.14-11-004**  
**SOCALGAS RESPONSE**  
**DATE RECEIVED: DECEMBER 9, 2014**  
**DATE RESPONDED: JANUARY 12, 2015**

**Exhibit Reference:** SCG-4, Gas Distribution O&M Expense and Capital Expenditures

**Subject:** Cathodic Protection

**Please provide the following:**

1. On page 116 of the workpapers SoCalGas presents a breakdown of the 2014-2016 cathodic protection packages. Please provide the following information regarding this request:
  - a. Please define what is meant by the terms (i) pairs of pounds of anodes and (ii) CP packages, (iii) shallow well, and (iv) deep well.
  - b. Describe how the terms in 1(a) above relate to one another and to the 18,100 miles of steel main and 752,000 steel services in SoCalGas' system;
  - c. Identify the elements that make up a magnesium anode CP package and the cost to purchase 1 magnesium CP package in 2013.
  - d. Identify the elements that make up an impressed current CP package and the cost to purchase 1 impressed current CP package in 2013.
  - e. Is there a difference between the number of CP packages needed for a "shallow well" versus a "deep well"? If so, please explain.
  - f. Please provide a detailed explanation of how SoCalGas determined the specific number and types of Capital CP Packages as identified in columns A-D for each year from 2014-2016, and include a copy of any and all calculations and documents used to develop SoCalGas' forecasts.

**SoCalGas Response 01:**

- a. The terms are defined / described below.
  - i. Typically, magnesium anodes are installed vertically in pairs (two anodes). The pounds shown on the referenced workpaper page refer to the individual anode weights. For example, "4 pairs of 20lb anodes" would be 8 anodes total, each weighing 20 pounds.
  - ii. A cathodic protection package represents an area which is being cathodically protected from corrosion. This area is isolated by insulators from other cathodically protected areas and pipe not under cathodic protection.
  - iii. A shallow well has a depth of 49 feet or less, and it protects an impressed current system.
  - iv. A deep well has a depth of 50 feet or greater, and it also protects an impressed current system.

**ORA DATA REQUEST  
 ORA-SCG-DR-021-DAO  
 SOCALGAS 2016 GRC – A.14-11-004  
 SOCALGAS RESPONSE  
 DATE RECEIVED: DECEMBER 9, 2014  
 DATE RESPONDED: JANUARY 12, 2015**

**SoCalGas Response to Question 1, Continued:**

- b. Please see the table below, provided in SoCalGas’ Master Data Request, Chapter 2, Question 6:

CP Area Size	CP Enhancement Required
<b>100-500 Feet</b>	1 pair of 20lb Anodes
<b>501-5,000 Feet</b>	2 pairs of 20lb Anodes
<b>5,001-10,000 Feet</b>	4 pairs of 20lb Anodes
<b>5,001-10,000 Feet</b>	Shallow Well
<b>&gt; 10,001 Feet</b>	6 pairs of 20lb Anodes
<b>&gt; 10,001 Feet</b>	Deep Well
<b>Total</b>	

The referenced miles of steel pipeline and number of services do not reflect all steel mains and services, but rather refer to the pipelines that are cathodically protected.. These pipelines are either protected by one of the methods shown above or another method. One example of another cathodic protection method is a single anode installed to protect a service that is not tied to a cathodically protected system.

Please note that while researching the historical cathodic protection mileages for this data request, Gas Distribution discovered an error in the miles of steel pipeline and number of steel services that are cathodically protected that were provided in Exhibit SCG-04, on page FBA-111. The corrected numbers will be provided in the response to 3.a. These corrections do not affect any cost forecasts or calculations.

- c. A magnesium cathodic protection package is made up of the steel pipe being protected, which generally has good to marginal coating; one to many sets of magnesium anodes; insulating fittings; and cathodic protection test stations. The cost to set up a new magnesium cathodic protection package can range from approximately \$10,000 to \$30,000, including labor.
- d. An impressed current cathodic protection package is made up of the steel pipe being protected, which generally has marginal to poor coating; two to ten mixed-metal anodes, depending on the whether it is a shallow or deep well; an electrical alternating current power source; a rectifier; insulating fittings; and many test stations. A shallow well costs approximately \$50,000 and a deep well costs approximately \$100,000 to install.

**ORA DATA REQUEST  
 ORA-SCG-DR-021-DAO  
 SOCALGAS 2016 GRC – A.14-11-004  
 SOCALGAS RESPONSE  
 DATE RECEIVED: DECEMBER 9, 2014  
 DATE RESPONDED: JANUARY 12, 2015**

**SoCalGas Response to Question 1, Continued:**

- e. An impressed current cathodic protection package is generally protected by one well, whether a deep well or a shallow well. However, there are larger cathodic protection areas (packages) that could be covered by more than one well.
- f. The total number of cathodic protection packages to be addressed through capital work was estimated to be 383. This number was based on a backlog of capital cathodic protection package near the end of 2013 and the projected increase in that number by mid-2014, when it was estimated that cathodic protection remediation activities could be ramped up.

As shown in the table provided in SoCalGas’ Master Data Request, Chapter 2, Question 6, there were 295 backlogged cathodic protection packages to be remediated through capital work near the end of 2013 (highlighted in the lower half of table below):

<b>CP Area Size</b>	<b>CP Enhancement Required</b>	<b>Number of CP Packages</b>
<b>100-500 Feet</b>	1 pair of 20lb Anodes	87
<b>501-5,000 Feet</b>	2 pairs of 20lb Anodes	746
<b>5,001-10,000 Feet</b>	4 pairs of 20lb Anodes	159
<b>5,001-10,000 Feet</b>	Shallow Well	26
<b>&gt; 10,001 Feet</b>	6 pairs of 20lb Anodes	68
<b>&gt; 10,001 Feet</b>	Deep Well	42
<b>Total</b>		1128

The number of new cathodic protection areas that would be out of tolerance by mid 2014 was estimated by cathodic protection subject matter experts, who based this estimate on the packages that had lowest reading in a cathodic protection area, 25 mV or less, and had an anniversary month in the first half of the year. The resulting estimate was an additional 88 cathodic protection packages that would require capital work, for a total backlog of 383 cathodic protection packages to be addressed through capital work. The breakdown is shown in the table below.

**ORA DATA REQUEST  
 ORA-SCG-DR-021-DAO  
 SOCALGAS 2016 GRC – A.14-11-004  
 SOCALGAS RESPONSE  
 DATE RECEIVED: DECEMBER 9, 2014  
 DATE RESPONDED: JANUARY 12, 2015**

**SoCalGas Response to Question 1f, Continued:**

CP Area Size	Capital CP Enhancement Required	2013 Backlog	Projected Growth in Backlog by Mid-2014	Total
5,001-10,000 Feet	4 pairs of 20lb Anodes	159	30	189
5,001-10,000 Feet	Shallow Well	68	28	96
> 10,001 Feet	6 pairs of 20lb Anodes	26	8	34
> 10,001 Feet	Deep Well	42	22	64
<b>Total</b>		<b>295</b>	<b>88</b>	<b>383</b>

It was estimated that it would take some time to ramp up activities to address the backlog, so it was estimated that approximately one-fifth of the 383 capital cathodic protection package backlog could be addressed in 2014, increasing to approximately two-fifths of the backlog in 2015 and 2016. The breakdown of the type of package to be completed in each year was also based on the estimate of availability of contractors to drill the wells. These estimates were provided by cathodic protection subject matter experts.

**ORA DATA REQUEST  
ORA-SCG-DR-021-DAO  
SOCALGAS 2016 GRC – A.14-11-004  
SOCALGAS RESPONSE  
DATE RECEIVED: DECEMBER 9, 2014  
DATE RESPONDED: JANUARY 12, 2015**

2. On pages FBA-112 to FBA-113, SoCalGas discusses its proposal to enhance the current cathodic protection system. Please provide the following information regarding this request:
  - a. On lines 23-25 SoCalGas states, “This incremental effort will focus on the assessment of the current protection systems (CP areas) with the goal of strategically combining multiple smaller areas into larger areas wherever possible and practical”. When does SoCalGas plan to perform an assessment of the CP systems?
  - b. Provide a copy of the most recent assessment of the cathodic protection systems.
  - c. Please provide support for the claim that SoCalGas has been experiencing an increase in the number of CP areas that require additional maintenance, including but not limited to any and all analyses and/or studies and/or calculations used to derive the statement on page FBA-112.

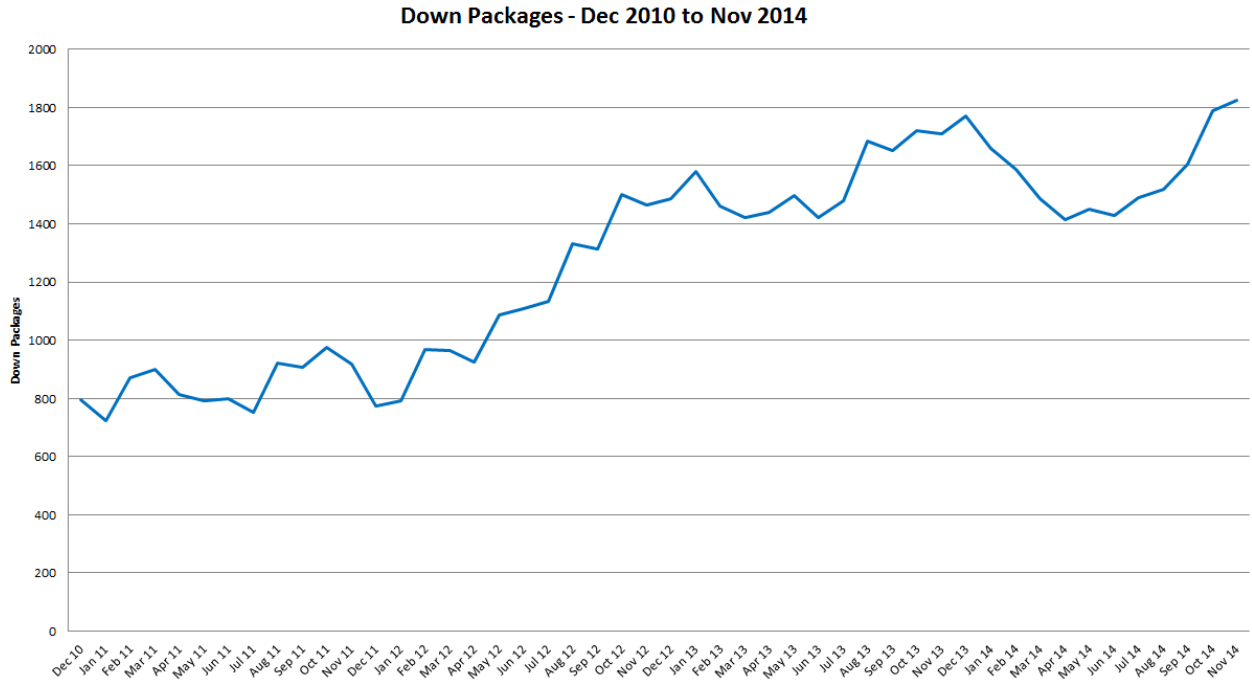
**SoCalGas Response 02:**

- a. Due to the large quantity of out-of-tolerance cathodic protection packages, this assessment is currently being performed and will continue through 2016.
- b. As described in the response to Question 2c. below, there are many factors that can affect the effectiveness of cathodic protection systems. Due to this complexity, each cathodic protection package must be analyzed separately and have a customized remediation recommendation. For this reason, there is no formal assessment of the cathodic protection systems; however, the backlog of cathodic protection packages, as of the end of November 2014, is 1,825 packages.
- c. SoCalGas’ backlog of pending cathodic protection packages in the Gas Distribution system has been growing in recent years. Please see the chart below which shows the historical growth of the cathodic protection package backlog that needs the additional remediation to make the cathodic protection more effective in protecting the pipeline. This increase is attributed to a number of factors that impact the effectiveness of a CP system, including:
  - The degradation of the external pipe coating that naturally occurs over time.
  - The reduction in output of a considerable number of magnesium anode beds as they age. Anode beds have a life expectancy of around 10 to 12 years.
  - Continuing dry weather. Lack of moisture in the soil tends to accelerate the depletion of magnesium anodes.
  - Interference, such as when pipes come into contact with water lines or with third-party grounding systems, which can drain current from the pipeline, thus reducing the level of protection and depleting anodes.

As a result of these factors, there is a need to replace an increasing number of depleting magnesium anode beds.

**ORA DATA REQUEST  
ORA-SCG-DR-021-DAO  
SOCALGAS 2016 GRC – A.14-11-004  
SOCALGAS RESPONSE  
DATE RECEIVED: DECEMBER 9, 2014  
DATE RESPONDED: JANUARY 12, 2015**

**SoCalGas Response to Question 2c, Continued:**



**ORA DATA REQUEST  
 ORA-SCG-DR-021-DAO  
 SOCALGAS 2016 GRC – A.14-11-004  
 SOCALGAS RESPONSE  
 DATE RECEIVED: DECEMBER 9, 2014  
 DATE RESPONDED: JANUARY 12, 2015**

3. On page FBA-111 SoCalGas states it has 18,100 miles of steel main and 752,000 steel services that are cathodically protected.
- a. Provide the number of miles of main and services protected by i) impressed current and by (ii) galvanic systems each year from 2009-2014 YTD.
  - b. For each year from 2009-2014 YTD, provide the number of miles of steel main and services, the magnesium anode protected areas and/or CP packages converted into impressed current areas and/or CP packages, and the annual expenses incurred. Please identify the expense as O&M and/or capital costs.
  - c. For each year from 2009-2014 YTD, provide the number of magnesium CP packages installed and the annual capital and/or O&M expenses incurred.
  - d. For each year from 2009-2014 YTD, provide the number of impressed current CP packages installed and the annual capital and/or O&M expenses incurred.

**SoCalGas Response 03:**

- a. There are currently approximately 10,000 miles of main cathodically protected by galvanic systems and 8,000 miles of main protected by rectified systems. The miles of pipe historically protected by these two cathodic protection methods is not readily available; however, the total miles of cathodically protected mains and services are shown in the table below.

	2009	2010	2011	2012 <sup>1</sup>	2013 <sup>2</sup>	2014 YTD
Miles of Cathodically Protected Distribution-Operated Mains	18,224	18,641	18,709	18,109	18,559	18,224
Miles of Cathodically Protected Distribution-Operated Services	8,469	8,462	8,435	8,538	8,393 <sup>3</sup>	8,469

<sup>1</sup> Please note that 2012 was a transitional year from the legacy mileage tracking system to the new GIS-based data that is being used currently.

<sup>2</sup> As stated in the response to question 1.b., while researching the historical cathodic protection mileages for this data request, Gas Distribution discovered an error in the miles of steel pipeline and number of steel services that are cathodically protected that were provided in Exhibit SCG-04, on page FBA-111. As of the end of 2013, SoCalGas had approximately 18,600 miles of steel main and approximately 751,000 steel services that were cathodically protected. These corrections do not affect any cost forecasts or calculations.

<sup>3</sup> 8,393 miles corresponds to approximately 751,000 services (average service length of 59 feet).

**ORA DATA REQUEST  
ORA-SCG-DR-021-DAO  
SOCALGAS 2016 GRC – A.14-11-004  
SOCALGAS RESPONSE  
DATE RECEIVED: DECEMBER 9, 2014  
DATE RESPONDED: JANUARY 12, 2015**

**SoCalGas Response to Question 3, Continued:**

- b. Response provided on 12/23/2014.
- c. The data being requested is not readily available.  
Many new cathodic protection installations are captured under the work order for a larger job. For example, a job to install new steel main will include the associated cathodic protection (galvanic or rectified) installations for the protection of that main. The cathodic protection work and costs for such projects are not captured separately.
- d. Please see the response to Question 3c above.



**ORA DATA REQUEST  
ORA-SCG-DR-021-DAO  
SOCALGAS 2016 GRC – A.14-11-004  
SOCALGAS RESPONSE  
DATE RECEIVED: DECEMBER 9, 2014  
DATE RESPONDED: JANUARY 12, 2015**

4. The capital and/or O&M expense (in 2013 dollars) to cathodically protect 1 mile of main using magnesium anode versus impressed current.

**SoCalGas Response 04:**

Gas Distribution does not track the cathodic protection expenses in terms of miles of pipeline. There is too much variability in what it takes to cathodically protect the system over its many thousands of miles to make a per mile comparison accurate and relevant. See the response to Question 2.c. above for all the things that can impact the effectiveness of cathodic protection.

**ORA DATA REQUEST  
ORA-SCG-DR-021-DAO  
SOCALGAS 2016 GRC – A.14-11-004  
SOCALGAS RESPONSE  
DATE RECEIVED: DECEMBER 9, 2014  
DATE RESPONDED: JANUARY 12, 2015**

5. The capital and/or O&M expense (in 2013 dollars) to cathodically protect 1 mile of services using magnesium anode versus impressed current.

**SoCalGas Response 05:**

Please see response to Question 4.

**ORA DATA REQUEST**  
**ORA-SCG-DR-021-DAO**  
**SOCALGAS 2016 GRC – A.14-11-004**  
**SOCALGAS RESPONSE**  
**DATE RECEIVED: DECEMBER 9, 2014**  
**DATE RESPONDED: JANUARY 12, 2015**

6. On page FBA-29 SoCalGas states on lines 25-28, “Over the last few years, the number of CP areas requiring follow up work has increased significantly...To address this situation, SoCalGas has implemented an effort to remediate 1,161 CP areas (CP packages) that have chronic issues.”
- a. Referring to the statement above, please provide support for this claim and include a copy of any and all studies/analyses/assessments/ and or any calculations used.
  - b. Referring to the statement above, please explain and provide support for the estimated 1,161 CP areas SoCalGas plans to remediate. Include a copy of any and all studies/analyses/assessments and all calculations used to derive this number.
  - c. Please explain and provide support for SoCalGas’ plans to work 193 packages in 2014, 387 packages in 2015, and 581 packages in 2016 as stated on pages FBA-29 to FBA-30.
  - d. Please state if the proposed number of packages to be worked in 2014-2016 identified on lines 30-31 of page FBA-29 and in question 6(c) above make up the total number of CP projects estimated to be worked on during this timeframe. If not, please provide the total number of CP projects SoCalGas proposes to work on from 2014-2016.
  - e. How many of the proposed 193 packages did SoCalGas complete in 2014 YTD?
  - f. When did SoCalGas first become aware that the 1,161 CP areas/packages need to be remediated?
  - g. How has SoCalGas addressed the 1,161 CP areas/packages since it became aware of the CP issues?
  - h. Provide a copy of the remediation plan for the 1,161 CP areas/packages.
  - i. How many of the 1,161 CP areas will be “worked” and charged as an O&M expense and how many will be “worked” or “converted” or “replaced” and charged as a capital expense?

**SoCalGas Response 06:**

- a. Please see the chart provided in response to Question 2c above which shows the historical growth of the cathodic protection package backlog that need the additional remediation to make the cathodic protection more effective in protecting the pipeline.

**ORA DATA REQUEST  
 ORA-SCG-DR-021-DAO  
 SOCALGAS 2016 GRC – A.14-11-004  
 SOCALGAS RESPONSE  
 DATE RECEIVED: DECEMBER 9, 2014  
 DATE RESPONDED: JANUARY 12, 2015**

**SoCalGas Response to Question 6, Continued:**

- b. The estimate of 1,161 cathodic protection packages corresponds to the number of cathodic packages to be remediated through O&M work. The number was based on a backlog of O&M cathodic protection package near the end of 2013 and the projected increase in that number by mid-2014, when it was estimated that cathodic protection remediation activities could be ramped up.

As shown in the table provided in SoCalGas’ Master Data Request, Chapter 2, Question 6, there were 833 backlogged cathodic protection packages to be remediated through O&M work near the end of 2013 (highlighted in the first two rows of the table below):

CP Area Size	CP Enhancement Required	Number of CP Packages
<b>100-500 Feet</b>	1 pair of 20lb Anodes	87
<b>501-5,000 Feet</b>	2 pairs of 20lb Anodes	746
<b>5,001-10,000 Feet</b>	4 pairs of 20lb Anodes	159
<b>5,001-10,000 Feet</b>	Shallow Well	26
<b>&gt; 10,001 Feet</b>	6 pairs of 20lb Anodes	68
<b>&gt; 10,001 Feet</b>	Deep Well	42
<b>Total</b>		1128

The number of new cathodic protection areas that would be out of tolerance by mid 2014 was estimated by cathodic protection subject matter experts, who based this estimate on the packages that had lowest reading in a cathodic protection area, 25 mV or less, and had an anniversary month in the first half of the year. The resulting estimate was an additional 45 cathodic protection packages that would require one pair of 20 pound anodes and an additional 283 cathodic protection packages that would require two pairs of 20 pound anodes.

The resulting total was estimated to be 1,161 cathodic protection packages that would be remediated through O&M work:

CP Area Size	O&M CP Enhancement Required	2013 Backlog	Projected Growth in Backlog by Mid-2014	Total
100-500 Feet	1 pair of 20lb Anodes	87	45	132
501-5,000 Feet	2 pairs of 20lb Anodes	746	283	1,029
<b>Total</b>		833	328	1,161

**ORA DATA REQUEST  
ORA-SCG-DR-021-DAO  
SOCALGAS 2016 GRC – A.14-11-004  
SOCALGAS RESPONSE**

**DATE RECEIVED: DECEMBER 9, 2014**

**DATE RESPONDED: JANUARY 12, 2015**

**SoCalGas Response to Question 6, Continued:**

- c. It was estimated that it would take some time to ramp up activities to address the backlog, so it was estimated that approximately one-sixth of the 1,161 O&M cathodic protection package backlog could be addressed in 2014, increasing to two-sixths (one third) of the backlog in 2015, and increasing to three-sixths (half) of the backlog in 2016. These numbers were based on estimates provided by cathodic protection subject matter experts.
- d. 1,161 represents the number of backlogged cathodic protection packages to be remediated through O&M work, which is incremental to the base level of cathodic protection packages to be worked. The base level of packages in the forecast years is not readily available, but since the forecast for cathodic protection is based on the five-year (2009-2013) average historical spending levels, the base level of cathodic protection packages to be completed will likely be approximately equal to the historical five-year (2009-2013) average.
- e. All of the 193 O&M cathodic protection were worked in 2014; however, new areas have been identified to be out-of-tolerance during the year.
- f. SoCalGas was aware that the cathodic protection backlog was growing for a number of years. In October of 2013, cathodic protection subject matter experts estimated that the O&M backlog that would need to be addressed would be 1,161. This estimate is described in more detail in the response to Question 6.b. above.
- g. SoCalGas is renewing multiple magnesium anode beds by adding anodes to keep the cathodic protection system working within tolerances and to extend the lifespan of the anode beds.
- h. Please refer to the supplemental workpaper, SCG-FBA-O&M-SUP-004 on page 40 of Exhibit SCG-04 for the plan to remediate the 1,161 O&M cathodic protection packages.
- i. All 1,161 cathodic protection packages listed on page FBA-29 are estimated to be remediated through O&M work. Please note that there are an additional 383 packages to be remediated through capital work, as described on page 116 of Exhibit SCG-04-CWP and in the response to Question 1.f. above. The total number of backlogged cathodic protection packages is 1,544.

**ORA DATA REQUEST  
ORA-SCG-DR-021-DAO  
SOCALGAS 2016 GRC – A.14-11-004  
SOCALGAS RESPONSE  
DATE RECEIVED: DECEMBER 9, 2014  
DATE RESPONDED: JANUARY 12, 2015**

7. Provide the number of CP areas/packages remediated annually from 2009-2014 YTD and the costs incurred. Please separately identify O&M versus capital costs.

**SoCalGas Response 07:**

The table below shows the number of cathodic protection packages remediated in the years 2011 through October 2014. The numbers for 2009 and 2010 are in a legacy system and are not readily accessible. SoCalGas implemented a new electronic SAP tracking technology in 2010.

Year	Cathodic Protection Packages Remediated
2011	3,346
2012	2,876
2013	3,221
2014 Through October	2,736

Gas Distribution does not track the costs associated with remediated cathodic protection packages separately, so the O&M and capital costs for this specific activity are not available.

**ORA DATA REQUEST  
ORA-SCG-DR-021-DAO  
SOCALGAS 2016 GRC – A.14-11-004  
SOCALGAS RESPONSE  
DATE RECEIVED: DECEMBER 9, 2014  
DATE RESPONDED: JANUARY 12, 2015**

8. On pages FBA-29 to FBA-30 SoCalGas discusses its request for O&M expenses regarding CP activities referred to as “work”, “remediation”, “installation and replacement of system components”. On pages FBA-110 to FBA-113 SoCalGas refers to CP activities for which it requests capital expenditures as “new installation and replacement of major CP components and equipment”, “maintain a cathodically protected area”, “convert” CP areas, “replace anode beds”, “assessment of current system”, and “installation and replacement of larger surface bed”. There appears to be an overlap in CP activities being requested for O&M and capital expenses. Please identify and explain in detail the differences of CP activities charged as an O&M expense versus a capital expenditure.

**SoCalGas Response 08:**

There is no overlap in cathodic protection activities being requested for O&M and capital expenses.

O&M Cathodic Protection work includes the following:

- Finding the location of the short, extensive analysis of both magnesium and impressed current systems.
- Cathodic protection readings.
- Replacement of magnesium anodes protecting 100 feet to 5,000 feet of pipe.
- Replacement of depleted impressed current anode beds.
- Mitigation work to bring a system back within tolerance, which can include clearing shorts, installing test stations, insulators, and bond cables.

Capital cathodic protection work includes the following:

- Converting cathodic protection packages which are greater than 5,000 feet into impressed current systems.
- Installing six or more magnesium anode beds along with the upgrades of the electronic insulating joints to existing magnesium anode cathodic protection packages.