

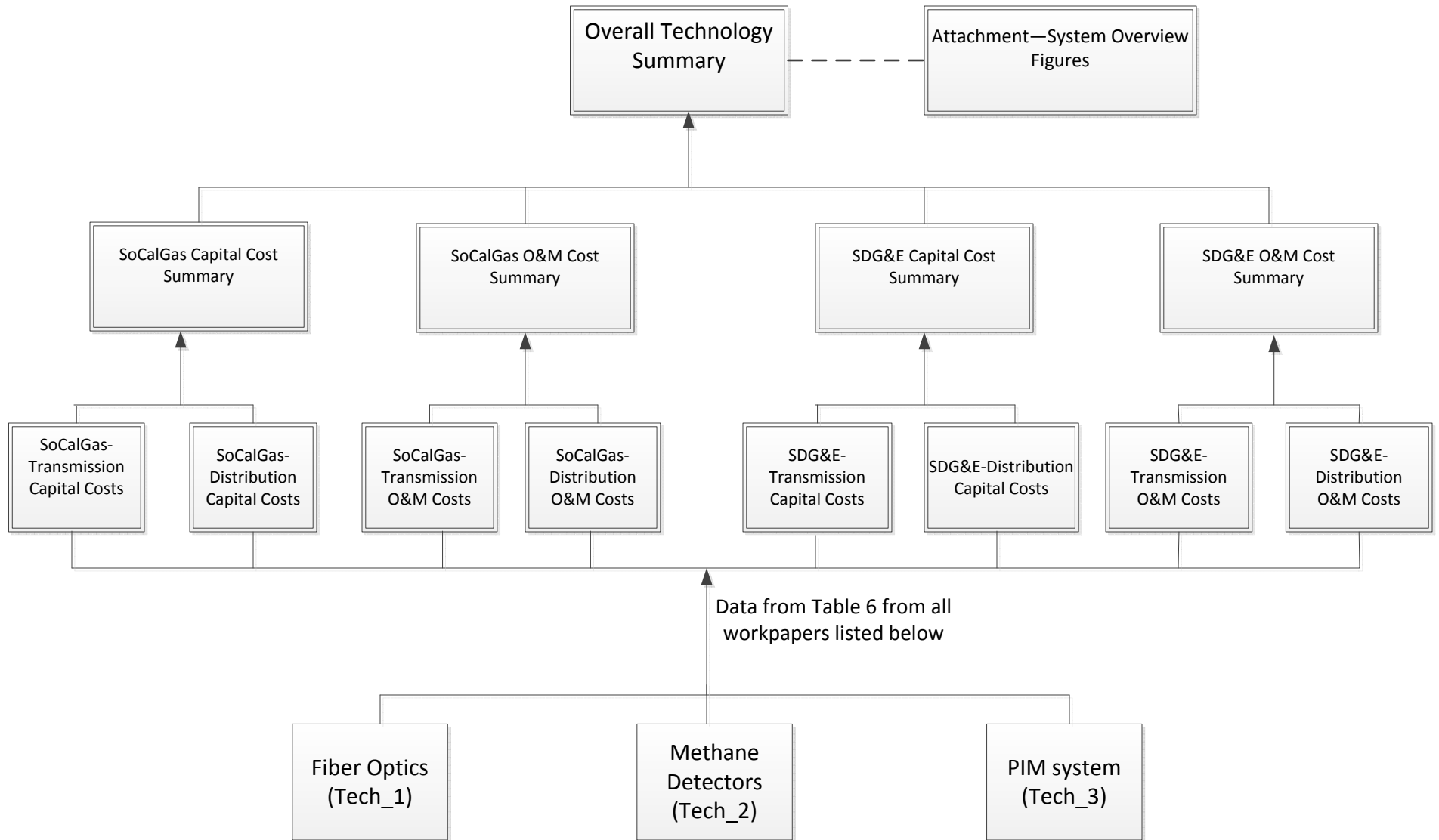
CHAPTER IX COST WORKPAPERS

Witness: J. M. Rivera

Pipeline Safety Enhancement Plan Summary Technology Workpapers

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Technology Enhancement Plan—Workpaper Map



Base Detailed Costs and Calculations for O&M and Capital are contained in the Tech workpapers with filename prefixes of Tech 1, Tech_2, and Tech_3...

CAPITAL WORKPAPER

WORKPAPER TITLE Overall Summary of Technology Plan Including Enterprise Polling System	FERC ACCT. 367 & 376
WITNESS Joseph Rivera	IN SERVICE DATE

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	2.7	3.4	1.0	0.3	7.4	0.8	8.2
DIRECT NON-LABOR	14.7	16.1	6.9	6.2	43.8	12.6	56.4
TOTAL DIRECT CAPITAL	17.4	19.4	7.9	6.5	51.2	13.4	64.6

Project Description

These series of worksheets covers total Capital cost for the technology elements described in Chapter VI, sections B, C, and D. This includes installing fiber optics on 276 miles of pipeline over ten-year period, installing 2000 methane detection sensors along high pressure pipelines, and development of computerized monitoring system to collect information for these and other future technologies. There are three basic worksheets (sub-workpapers) detailing cost developed for each of these elements. These papers include unit costs for installation, operation and maintenance for fiber optic monitoring by mile, methane detectors by units installed; and for a Pipeline Infrastructure Monitoring System. These sub workpapers are labeled "Tech_1_Fiberoptic," "Tech_2_Methane," and "Tech_3_PIM", respectively. All Capital and O&M costs derived for this system are base-calculated and allocated to the companies by labor, non-labor; and FERC accounts (distribution/transmission) from these workpapers. Table 6 in each of those workpapers provides the Plan allocations to Company, expense type and FERC account. The total Plan capital requirements are contained in Table B below, as derived from all Capital line entries in Table 6 (SoCalGas and SDG&E sub-sections) from the three sub-workpapers.

Forecast Methodology

See Detailed Sub Work Papers.

Schedule

The installation schedule by technology type can be found in Table 1 in each of the three sub-work papers as referenced. Fiber and methane monitoring capital installations will extend over a ten-year period. System development/expansion of the PIM system occurs over a five-year period. Cost by Element is presented in Table 2 below. These cost are compiled from information contained in Table 6 of each Technology workpapers under the "Capital" row headings. The table represents combined SoCalGas and SDG&E costs.

CAPITAL WORKPAPER

WORKPAPER TITLE Overall Summary of Technology Plan Including Enterprise Polling System	FERC ACCT. 367 & 376
WITNESS Joseph Rivera	IN SERVICE DATE

Table 2		Cost Allocation to Company and FERC Capital						
PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total	
ROW FIBER OPTIC							26.8	
DIRECT LABOR	0.2	0.2	0.2	0.2	0.8	0.2	1.0	
DIRECT NON-LABOR	5.1	5.1	5.1	5.3	20.7	5.0	25.8	
METHANE DETECTORS							9.6	
DIRECT LABOR	-	0.1	0.2	0.1	0.3	0.5	0.8	
DIRECT NON-LABOR	-	0.9	1.8	0.9	3.5	5.3	8.8	
PIM							28.2	
DIRECT LABOR	2.5	3.1	0.6	0.0	6.2	0.1	6.4	
DIRECT NON-LABOR	9.5	10.0	0.0	0.0	19.6	2.3	21.9	
PLAN TOTALS-CAPITAL							64.6	
DIRECT LABOR	2.7	3.4	1.0	0.3	7.4	0.8	8.2	
DIRECT NON-LABOR	14.7	16.1	6.9	6.2	43.8	12.6	56.4	

Detailed Work Paper	Testimony Reference
FIBER	VI.B & IX.C.2
METHANE	VI.C & IX.C.2
PIM	VI.D & IX.C.2

CAPITAL WORKPAPER

WORKPAPER TITLE SoCalGas Summary of Technology Capital, Including Enterprise Polling System	FERC ACCT. 367 & 376
WITNESS Joseph Rivera	IN SERVICE DATE

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	2.4	3.0	0.8	0.3	6.5	0.7	7.2
DIRECT NON-LABOR	12.9	14.1	6.1	5.5	38.5	11.1	49.6
TOTAL DIRECT CAPITAL	15.3	17.1	6.9	5.7	45.0	11.8	56.8

Project Description

This series of worksheets covers total SoCalGas cost for the technology elements described in Chapter VI in section B through D and for which cost summaries are presented in Section IX.C.2. For the combined utilities, this plan includes installing fiber optics along 276 miles of pipeline section over ten-year period, installing 2000 methane detection sensors along high pressure pipelines, and development of computerized monitoring system to collect information from these and other future monitoring technologies. There are three basic worksheets (sub-workpapers) detailing how cost were derived for each of these Elements. These sub-workpapers include basic unit costs for installation, operation and maintenance associated with fiber by mile, and methane detectors by units installed and for PIM system buildout. These detailed subwork papers are labeled "Tech_1_Fiber optic, Tech_2_Methane, and Tech_3_PIM".

Forecast Methodology

Table 6 in each sub-workpaper provides the capital cost allocation to SoCalGas for the three Elements. Capital between the companies is allocated based on relative mileage which may be equipped with such assets in the future. The distribution/transmission split is based on combined utility miles of high-pressure, large-diameter pipelines operated as distribution and transmission assets, respectively. Table 3 below provides a summary of capital allocations as taken from table 7a and 7b in each sub-worksheet. Those allocations are multiplied by the capital cost per year in Table 2 of those work sheets to produce Table 6 results in each sub-worksheet. The results shown below in Table 2 represent all Table 6 line entries associate with capital costs under the SoCalGas sub-table.

Schedule

The installation schedule details can be found in Table 1 in each of the three subwork papers for Fiber Optics, Methane Detectors, and PIM.

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
ROW FIBER OPTIC							23.5
DIRECT LABOR	0.2	0.2	0.2	0.2	0.7	0.2	0.9
DIRECT NON-LABOR	4.5	4.5	4.5	4.7	18.2	4.4	22.6
METHANE DETECTORS							8.5
DIRECT LABOR	-	0.1	0.1	0.1	0.3	0.4	0.7
DIRECT NON-LABOR	-	0.8	1.6	0.8	3.1	4.7	7.8
PIM							24.8
DIRECT LABOR	2.2	2.7	0.5	0.0	5.5	0.1	5.6
DIRECT NON-LABOR	8.4	8.8	0.0	0.0	17.2	2.0	19.2
PLAN TOTALS-CAPITAL							56.8
DIRECT LABOR	2.4	3.0	0.8	0.3	6.5	0.7	7.2
DIRECT NON-LABOR	12.9	14.1	6.1	5.5	38.5	11.1	49.6

Detailed Work Paper	Testimony Reference
FIBER	VI.B & IX.C.2
METHANE	VI.C & IX.C.2
PIM	VI.D & IX.C.2

WORKPAPER TITLE SoCalGas Summary of Technology Capital, Including Enterprise Polling System	FERC ACCT. 367 & 376
WITNESS Joseph Rivera	IN SERVICE DATE

Table 3		Cost Allocation by Company and FERC Account		
	Company Split %	% FERC 376	% FERC 367	Allocation Method Summary
FIBER OPTIC				
SDGE	12			Company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles operating above 200 psig.
SoCalGas	88			
Dist		0		
Trans			100	100% transmission
METHANE DETECTORS				
SDGE	12			Company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles operating above 200 psig.
SoCalGas	88			
Dist		25		Ratio of DOT transmission pipelines miles operated by distribution or transmission relative to the total pipelines miles to be monitored.
Trans			75	
PIM				
SDGE	12			Company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles operating above 200 psig.
SoCalGas	88			
Dist		25		Ratio of DOT transmission pipelines miles operated by distribution or transmission relative to the total pipelines miles to be monitored.
Trans			75	

CAPITAL WORKPAPER

WORKPAPER TITLE SoCalGas Transmission Technology Capital	FERC ACCT. 367
WITNESS Joseph Rivera	IN SERVICE DATE

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.9	2.3	0.7	0.2	5.0	0.6	5.6
DIRECT NON-LABOR	10.8	11.7	5.7	5.3	33.5	9.4	42.9
TOTAL DIRECT CAPITAL	12.6	14.0	6.4	5.5	38.5	10.0	48.5

Project Description

This workpaper provides a summary of all Technology Plan Capital costs allocated to SoCalGas transmission FERC account 367.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic ", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SoCalGas capital work associated with the three Technology Plan Elements. Table 2 below provides the SoCalGas transmission capital cost summation for each of the "Capital" and "Transmission" row entries in the "SoCalGas" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SoCalGas capital for transmission labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SoCalGas transmission allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpapers and are summarized in Table 3 in the SoCalGas Capital Summary preceding this workpaper.

Schedule

The installation schedule details can be found in Table 1 in each of the three sub workpapers for Fiber Optics, Methane Detectors, and PIM. Units, mileage and PIM costs assignable to SoCalGas are proportional to the Company capital allocation ratio (88%) of total cost, with the transmission allocation of capital units and costs at 75% of Company total.

CAPITAL WORKPAPER

WORKPAPER TITLE SoCalGas Transmission Technology Capital	FERC ACCT. 367
WITNESS Joseph Rivera	IN SERVICE DATE

TABLE 2

SCG Transmission Cost by Technology Type

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
FIBER OPTIC							23.5
DIRECT LABOR	0.2	0.2	0.2	0.2	0.7	0.2	0.9
DIRECT NON-LABOR	4.5	4.5	4.5	4.7	18.2	4.4	22.6
METHANE DETECTORS							6.3
DIRECT LABOR	-	0.1	0.1	0.1	0.2	0.3	0.5
DIRECT NON-LABOR	-	0.6	1.2	0.6	2.3	3.5	5.8
PIM							18.6
DIRECT LABOR	1.7	2.0	0.4	0.0	4.1	0.1	4.2
DIRECT NON-LABOR	6.3	6.6	0.0	0.0	12.9	1.5	14.4
PLAN TOTALS-CAPITAL							48.5
DIRECT LABOR	1.9	2.3	0.7	0.2	5.0	0.6	5.6
DIRECT NON-LABOR	10.8	11.7	5.7	5.3	33.5	9.4	42.9

CAPITAL WORKPAPER

WORKPAPER TITLE SoCalGas Distribution Technology Capital	FERC ACCT. 376
WITNESS Joseph Rivera	IN SERVICE DATE

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.6	0.7	0.2	0.0	1.4	0.1	1.6
DIRECT NON-LABOR	2.1	2.4	0.4	0.2	5.1	1.7	6.7
TOTAL DIRECT CAPITAL	2.7	3.1	0.6	0.2	6.5	1.8	8.3

Project Description

This workpaper provides a summary of all Technology Plan Capital costs allocated to SoCalGas distribution FERC account 376.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic ", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SoCalGas capital work associated with the three Technology Plan Elements. Table 2 below provides the SoCalGas distribution capital cost summation for each of the "Capital" and "distribution" row entries in the "SoCalGas" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SoCalGas capital for distribution labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SoCalGas distribution allocation. Company and FERC allocations are presented in Tables 7a and 7b of those tables and are summarized in Table 3 in the SoCalGas Capital Summary preceding this workpaper.

Schedule

The installation schedule details can be found in Table 1 in each of the three sub workpapers for Fiber Optics, Methane Detectors, and PIM. Units, mileage and PIM costs assignable to SoCalGas are proportional to the Company capital allocation ratio (88%) of total cost, with the distribution allocation of capital units and costs at 25% of Company total.

CAPITAL WORKPAPER

WORKPAPER TITLE SoCalGas Distribution Technology Capital	FERC ACCT. 376
WITNESS Joseph Rivera	IN SERVICE DATE

TABLE 2	SCG Distribution Cost by Technology Type						
PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
FIBER OPTIC							-
DIRECT LABOR	-	-	-	-	-	-	-
DIRECT NON-LABOR	-	-	-	-	-	-	-
METHANE DETECTORS							2.1
DIRECT LABOR	-	0.0	0.0	0.0	0.1	0.1	0.2
DIRECT NON-LABOR	-	0.2	0.4	0.2	0.8	1.2	1.9
PIM							6.2
DIRECT LABOR	0.6	0.7	0.1	0.0	1.4	0.0	1.4
DIRECT NON-LABOR	2.1	2.2	0.0	0.0	4.3	0.5	4.8
PLAN TOTALS-CAPITAL							8.3
DIRECT LABOR	0.6	0.7	0.2	0.0	1.4	0.1	1.6
DIRECT NON-LABOR	2.1	2.4	0.4	0.2	5.1	1.7	6.7

CAPITAL WORKPAPER

WORKPAPER TITLE SDG&E Summary of Technology Capital, Including Enterprise Polling System	FERC ACCT. 367 & 376
WITNESS Joseph Rivera	IN SERVICE DATE

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.3	0.4	0.1	0.0	0.9	0.1	1.0
DIRECT NON-LABOR	1.8	1.9	0.8	0.7	5.3	1.5	6.8
TOTAL DIRECT CAPITAL	2.1	2.3	1.0	0.8	6.2	1.6	7.8

Project Description

This series of worksheets covers total SDG&E cost for the technology elements described in Chapter VI in section B through D and for which cost summaries are presented in Section IX.C.2. For the combined utilities, this plan includes installing fiber optics along 276 miles of pipeline section over ten-year period, installing 2000 methane detection sensors along high pressure pipelines, and development of computerized monitoring system to collect information from these and other future monitoring technologies. There are three basic worksheets (sub-workpapers) detailing how cost were derived to for each of these elements. These sub-workpapers include basic unit costs for installation, operation and maintenance associated with fiber by mile, and methane detectors by units installed and for PIM system buildout. These detailed subwork papers are labeled "Tech_1_Fiberoptic, Tech_2_Methane, and Tech_3_PIM".

Forecast Methodology

Table 6 in each sub-workpaper provides the capital cost allocation to SDG&E for the three Elements. Capital between the companies is allocated based on relative mileage which may be equipped with such assets in the future. The distribution/transmission split is based on combined utility miles of high-pressure, large-diameter pipelines operated as distribution and transmission assets, respectively. Table 3 below provides a summary of capital allocations as taken from table 7a and 7b in each sub-worksheet. Those allocations are multiplied by the capital cost per year in Table 2 of those work sheets to produce Table 6 results in each sub-worksheet. The results shown below in Table 2 represent all Table 6 line entries associate with capital costs under the SDG&E sub-table.

Schedule

The installation schedule details can be found in Table 1 in each of the three subwork papers for Fiber Optics, Methane Detectors, and PIM.

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
ROW FIBER OPTIC							3.2
DIRECT LABOR	0.0	0.0	0.0	0.0	0.1	0.0	0.1
DIRECT NON-LABOR	0.6	0.6	0.6	0.6	2.5	0.6	3.1
METHANE DETECTORS							1.2
DIRECT LABOR	-	0.0	0.0	0.0	0.0	0.1	0.1
DIRECT NON-LABOR	-	0.1	0.2	0.1	0.4	0.6	1.1
PIM							3.4
DIRECT LABOR	0.3	0.4	0.1	0.0	0.8	0.0	0.8
DIRECT NON-LABOR	1.1	1.2	0.0	0.0	2.4	0.3	2.6
PLAN TOTALS-CAPITAL							7.8
DIRECT LABOR	0.3	0.4	0.1	0.0	0.9	0.1	1.0

Detailed Work Paper	Testimony Reference
FIBER	VI.B & IX.C.2
METHANE	VI.C & IX.C.2
PIM	VI.D & IX.C.2

CAPITAL WORKPAPER

WORKPAPER TITLE		FERC ACCT.					
SDG&E Summary of Technology Capital, Including Enterprise Polling System		367 & 376					
WITNESS		IN SERVICE DATE					
Joseph Rivera							
DIRECT NON-LABOR	1.8	1.9	0.8	0.7	5.3	1.5	6.8

Table 3 Cost Allocation by Company and FERC Account

	Company Split %	% FERC 376	% FERC 367	Allocation Method Summary
FIBER OPTIC				
SDGE	12			Company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles operating above 200 psig.
SoCalGas	88			
Dist		0		
Trans			100	
METHANE DETECTORS				
SDGE	12			Ratio of DOT transmission pipelines miles operated by distribution or transmission relative to the total pipelines miles to be monitored.
SoCalGas	88			
Dist		25		
Trans			75	
PIM				
SDGE	12			Ratio of DOT transmission pipelines miles operated by distribution or transmission relative to the total pipelines miles to be monitored.
SoCalGas	88			
Dist		25		
Trans			75	

CAPITAL WORKPAPER

WORKPAPER TITLE SDG&E Transmission Technology Capital	FERC ACCT. 367
WITNESS Joseph Rivera	IN SERVICE DATE

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.3	0.3	0.1	0.0	0.7	0.1	0.8
DIRECT NON-LABOR	1.5	1.6	0.8	0.7	4.6	1.3	5.9
TOTAL DIRECT CAPITAL	1.7	1.9	0.9	0.8	5.3	1.4	6.7

Project Description

This workpaper provides a summary of all Technology Plan Capital costs allocated to SDG&E transmission FERC account 367.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic ", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SDG&E capital work associated with the three Technology Plan Elements. Table 2 below provides the SDG&E transmission capital cost summation for each of the "Capital" and "Transmission" row entries in the "SDG&E" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SDG&E capital for transmission labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SDG&E transmission allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpaper tables and are summarized in Table 3 in the SDG&E Capital Summary preceding this workpaper.

Schedule

The installation schedule details can be found in Table 1 in each of the three sub workpapers for Fiber Optics, Methane Detectors, and PIM. Units, mileage and PIM costs assignable to SDG&E are proportional to the Company capital allocation ratio (12%) of total cost, with the transmission allocation of capital units and costs at 75% of Company total.

CAPITAL WORKPAPER

WORKPAPER TITLE SDG&E Transmission Technology Capital	FERC ACCT. 367
WITNESS Joseph Rivera	IN SERVICE DATE

TABLE 2	SDG&E Transmission Cost by Technology Type						
PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
FIBER OPTIC							3.2
DIRECT LABOR	0.0	0.0	0.0	0.0	0.1	0.0	0.1
DIRECT NON-LABOR	0.6	0.6	0.6	0.6	2.5	0.6	3.1
METHANE DETECTORS							0.9
DIRECT LABOR	-	0.0	0.0	0.0	0.0	0.0	0.1
DIRECT NON-LABOR	-	0.1	0.2	0.1	0.3	0.5	0.8
PIM							2.6
DIRECT LABOR	0.2	0.3	0.1	0.0	0.6	0.0	0.6
DIRECT NON-LABOR	0.9	0.9	0.0	0.0	1.8	0.2	2.0

PLAN TOTALS-CAPITAL							6.7
DIRECT LABOR	0.3	0.3	0.1	0.0	0.7	0.1	0.8
DIRECT NON-LABOR	1.5	1.6	0.8	0.7	4.6	1.3	5.9

CAPITAL WORKPAPER

WORKPAPER TITLE SDG&E Distribution Technology Capital	FERC ACCT. 376
WITNESS Joseph Rivera	IN SERVICE DATE

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.1	0.1	0.0	0.0	0.2	0.0	0.2
DIRECT NON-LABOR	0.3	0.3	0.1	0.0	0.7	0.2	0.9
TOTAL DIRECT CAPITAL	0.4	0.4	0.1	0.0	0.9	0.2	1.1

Project Description

This workpaper provides a summary of all Technology Plan Capital costs allocated to SDG&E distribution FERC account 376.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic ", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SDG&E capital work associated with the three Technology Plan Elements. Table 2 below provides the SDG&E distribution capital cost summation for each of the "Capital" and "distribution" row entries in the "SDG&E" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SDG&E capital for distribution labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SDG&E distribution allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpaper tables and are summarized in Table 3 in the SDG&E Capital Summary preceding this workpaper.

Schedule

The installation schedule details can be found in Table 1 in each of the three sub workpapers for Fiber Optics, Methane Detectors, and PIM. Units, mileage and PIM costs assignable to SDG&E are proportional to the Company capital allocation ratio (12%) of total cost, with the distribution allocation of capital units and costs at 25% of Company total.

CAPITAL WORKPAPER

WORKPAPER TITLE SDG&E Distribution Technology Capital	FERC ACCT. 376
WITNESS Joseph Rivera	IN SERVICE DATE

TABLE 2

SDG&E Distribution Cost by Technology Type

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
FIBER OPTIC							-
DIRECT LABOR	-	-	-	-	-	-	-
DIRECT NON-LABOR	-	-	-	-	-	-	-
METHANE DETECTORS							0.3
DIRECT LABOR	-	0.0	0.0	0.0	0.0	0.0	0.0
DIRECT NON-LABOR	-	0.0	0.1	0.0	0.1	0.2	0.3
PIM							0.9
DIRECT LABOR	0.1	0.1	0.0	0.0	0.2	0.0	0.2
DIRECT NON-LABOR	0.3	0.3	0.0	0.0	0.6	0.1	0.7
PLAN TOTALS-CAPITAL							1.1
DIRECT LABOR	0.1	0.1	0.0	0.0	0.2	0.0	0.2
DIRECT NON-LABOR	0.3	0.3	0.1	0.0	0.7	0.2	0.9

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Overall Summary of Technology O&M, Including Enterprise Polling System	859.1 & 874.4
WITNESS	
Joseph Rivera	

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.3	0.3	0.6	0.6	1.7	3.2	4.9
DIRECT NON-LABOR	0.0	0.0	0.3	0.4	0.8	2.6	3.4
TOTAL DIRECT O&M	0.3	0.4	0.9	0.9	2.5	5.8	8.3

Project Description

The Technology Plan contains three major capital Elements (see Table 2 below), which are described in brevity in Chapter VI, Sections B through D, with associated costs summarized in Section IX.C.2. This workpaper presents a summary of Operating and Maintenance (O&M) cost associated with these capital plant additions for both utilities. Total Plan O&M expenses are summarized below. Breakdown by company and FERC accounts reflective of distribution and transmission operations follow this summary for both companies.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SoCalGas O&M work associated with the three Technology Plan Elements. Table 2 below provides the SoCalGas transmission O&M cost summation for each of the "O&M" and "Transmission" row entries in the "SoCalGas" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SoCalGas O&M for transmission labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SoCalGas transmission allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpapers and are summarized in Table 3 in the SoCalGas and SDG&E O&M Summaries following this workpaper.

Schedule

Table 1 in each of the Technology Element sub-workpapers outlines the asset installation schedule which drives O&M costs. Calculations for O&M requirements by-year are presented in Tables 4 and 5 of those sub-workpapers and related discussion.

**Table 2
Cost Summary by Technology Type**

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
ROW FIBER OPTIC							1.4
DIRECT LABOR	0.0	0.0	0.1	0.1	0.2	0.6	0.8
DIRECT NON-LABOR	0.0	0.0	0.0	0.1	0.2	0.4	0.6
METHANE DETECTORS							0.9
DIRECT LABOR	-	0.0	0.0	0.0	0.1	0.4	0.4
DIRECT NON-LABOR	-	0.0	0.0	0.0	0.1	0.4	0.5
PIM							6.1
DIRECT LABOR	0.3	0.3	0.5	0.4	1.5	2.3	3.7
DIRECT NON-LABOR	-	-	0.3	0.3	0.6	1.8	2.3
PLAN TOTALS-O&M							8.3
DIRECT LABOR	0.3	0.3	0.6	0.6	1.7	3.2	4.9
DIRECT NON-LABOR	0.0	0.0	0.3	0.4	0.8	2.6	3.4

Detailed Work Paper	Testimony Reference
FIBER	VI.B & IX.C.2
METHANE	VI.C & IX.C.2
PIM	VI.D & IX.C.2

WORKPAPER TITLE SoCalGas Summary of Technology O&M, Including Enterprise Polling System	FERC ACCT. 859.1 & 874.4
WITNESS Joseph Rivera	

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.3	0.3	0.5	0.5	1.5	2.8	4.3
DIRECT NON-LABOR	0.0	0.0	0.3	0.3	0.7	2.3	3.0
TOTAL DIRECT O&M	0.3	0.3	0.8	0.8	2.2	5.1	7.3

Project Description

This workpaper provides a summary of all Technology Plan O&M costs allocated to SCG under FERC accounts 859.1 for transmission and 874.4 for distribution. It includes operation and maintenance totals for fiber optic monitoring, methane detection and a host Pipeline Infrastructure Monitoring system.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SoCalGas O&M work associated with the three Technology Plan Elements. Table 2 below provides the SoCalGas transmission O&M cost summation for each of the "O&M" and "Transmission" row entries in the "SoCalGas" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SoCalGas O&M for transmission labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SoCalGas transmission allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpapers and are summarized and as shown in Table 3 below.

Schedule

The O&M expenditures in Table 2 below are based on the installation schedules and in-service assets placement for fiber, methane detection and PIM buildout as delineated in Table 1 of each-sub workpaper; and the annual costs as-computed in Table 5; which are allocated to SoCalGas O&M in Table 6 under the schedules presented in Table(s) 7 of those same workpapers. Table 3 below provides a summary of O&M allocations for all Technology elements, by company and FERC designation, as derived or noted in Tables 7a and b in each Technology Element sub-work paper.

Table 2 Cost Summary by Technology Type

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
ROW FIBER OPTIC							1.2
DIRECT LABOR	0.0	0.0	0.1	0.1	0.2	0.5	0.7
DIRECT NON-LABOR	0.0	0.0	0.0	0.1	0.1	0.4	0.5
METHANE DETECTORS							0.2
DIRECT LABOR	-	0.0	0.0	0.0	0.1	0.0	0.1
DIRECT NON-LABOR	-	0.0	0.0	0.0	0.1	0.1	0.1
PIM							5.9
DIRECT LABOR	0.3	0.2	0.4	0.4	1.3	2.3	3.6
DIRECT NON-LABOR	-	-	0.2	0.3	0.5	1.8	2.3
PLAN TOTALS-O&M							7.3
DIRECT LABOR	0.3	0.3	0.5	0.5	1.6	2.8	4.4
DIRECT NON-LABOR	0.0	0.0	0.3	0.4	0.7	2.2	2.9

Detailed Work Paper	Testimony Reference
FIBER	VI.B & IX.C.2
METHANE	VI.C & IX.C.2
PIM	VI.D & IX.C.2

WORKPAPER TITLE SoCalGas Summary of Technology O&M, Including Enterprise Polling System	FERC ACCT. 859.1 & 874.4
WITNESS Joseph Rivera	

Table 3		Cost Allocation by FERC Account		
	Company Split %	% FERC 874.4	% FERC 859.1	Allocation Method Summary
FIBER OPTIC				
SDGE	12			It is the company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles for & operating above 200 psig
SoCalGas	88			
Dist		0		
Trans			100	100% transmission
METHANE DETECTORS				
SDGE	12			It is the company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles for & operating above 200 psig
SoCalGas	88			
Dist		25		It is ratio of DOT transmission pipelines miles operated by distribution or transmission relative to the total pipelines miles to be monitored.
Trans			75	
PIM				
SDGE	12			It is the company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles for & operating above 200 psig
SoCalGas	88			
Dist		25		It is ratio of DOT transmission pipelines miles operated by distribution or transmission relative to the total pipelines miles to be monitored.
Trans			75	

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE SoCalGas Transmission Technology O&M	FERC ACCT. 859.1
WITNESS Joseph Rivera	

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.2	0.2	0.4	0.4	1.2	2.2	3.4
DIRECT NON-LABOR	0.0	0.0	0.2	0.3	0.6	1.8	2.4
TOTAL DIRECT O&M	0.2	0.2	0.6	0.7	1.8	4.0	5.8

Project Description

This workpaper provides a summary of all Technology Plan O&M costs allocated to SoCalGas Transmission FERC account 859.1.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SoCalGas O&M work associated with the three Technology Plan Elements. Table 2 below provides the SoCalGas transmission O&M cost totals for each of the "O&M" and "Transmission" row entries in the "SoCalGas" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SoCalGas O&M for transmission labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SoCalGas transmission allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpapers and are summarized in Table 3 in the SoCalGas in the preceding workpaper.

Schedule

The O&M expenditures in Table 2 below are based on the installation schedule delineated in Table 1 of each sub-workpaper and the annual costs computed in Table 5; which are allocated to SoCalGas Transmission O&M in Table 6 under the schedules presented in Tables 7a and 7b of those same workpapers.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE SoCalGas Transmission Technology O&M	FERC ACCT. 859.1
WITNESS Joseph Rivera	

TABLE 2 Cost Summary for O&M by Technology Type							
PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
FIBER OPTIC							1.2
DIRECT LABOR	0.0	0.0	0.1	0.1	0.2	0.5	0.7
DIRECT NON-LABOR	0.0	0.0	0.0	0.1	0.1	0.4	0.5
METHANE DETECTORS							0.6
DIRECT LABOR	-	0.0	0.0	0.0	0.0	0.2	0.3
DIRECT NON-LABOR	-	0.0	0.0	0.0	0.0	0.3	0.3
PIM							4.0
DIRECT LABOR	0.2	0.2	0.3	0.3	1.0	1.5	2.5
DIRECT NON-LABOR	-	-	0.2	0.2	0.4	1.2	1.5

PLAN TOTALS-O&M							5.8
DIRECT LABOR	0.2	0.2	0.4	0.4	1.2	2.2	3.4
DIRECT NON-LABOR	0.0	0.0	0.2	0.3	0.6	1.8	2.4

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE SoCalGas Distribution Technology O&M	FERC ACCT. 874.4
WITNESS Joseph Rivera	

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.1	0.1	0.1	0.1	0.3	0.6	0.9
DIRECT NON-LABOR	-	0.0	0.1	0.1	0.1	0.5	0.6
TOTAL DIRECT O&M	0.1	0.1	0.2	0.2	0.5	1.1	1.5

Project Description

This workpaper provides a summary of all Technology Plan O&M costs allocated to SoCalGas Distribution FERC account 874.4.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic ", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SoCalGas O&M work associated with the three Technology Plan Elements. Table 2 below provides the SoCalGas transmission O&M cost totals for each of the "O&M" and "Transmission" row entries in the "SoCalGas" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SoCalGas O&M for transmission labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SoCalGas transmission allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpapers and are summarized in Table 3 in the SoCalGas and SDG&E O&M Summaries following this workpaper.

Schedule

The O&M expenditures in Table 2 below are based on the installation schedule delineated in Table 1 of each sub-workpaper and the annual costs computed in Table 5; which are allocated to SoCalGas Distribution O&M in Table 6 under the schedules presented in Tables 7a and 7b of those same workpapers.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE SoCalGas Distribution Technology O&M	FERC ACCT. 874.4
WITNESS Joseph Rivera	

TABLE 2							
Cost Summary for O&M by Technology Type							
PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
FIBER OPTIC							-
DIRECT LABOR	-	-	-	-	-	-	-
DIRECT NON-LABOR	-	-	-	-	-	-	-
METHANE DETECTORS							0.2
DIRECT LABOR	-	0.0	0.0	0.0	0.0	0.1	0.1
DIRECT NON-LABOR	-	0.0	0.0	0.0	0.0	0.1	0.1
PIM							1.3
DIRECT LABOR	0.1	0.1	0.1	0.1	0.3	0.5	0.8
DIRECT NON-LABOR	-	-	0.1	0.1	0.1	0.4	0.5
PLAN TOTALS-O&M							1.5
DIRECT LABOR	0.1	0.1	0.1	0.1	0.3	0.6	0.9
DIRECT NON-LABOR	-	0.0	0.1	0.1	0.1	0.5	0.6

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Summary of Technology O&M, Including Enterprise Polling System	859.1 & 874.4
WITNESS	
Joseph Rivera	

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.0	0.0	0.1	0.1	0.2	0.4	0.6
DIRECT NON-LABOR	0.0	0.0	0.0	0.0	0.1	0.3	0.4
TOTAL DIRECT O&M	0.0	0.0	0.1	0.1	0.3	0.7	1.0

Project Description

This workpaper provides a summary of all Technology Plan O&M costs allocated to SDG&E under FERC accounts 859.1 for transmission and 874.4 for distribution. It includes maintenance for fiber optic monitoring, methane detection and a host Pipeline Infrastructure Monitoring system.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SoCalGas O&M work associated with the three Technology Plan Elements. Table 2 below provides the SoCalGas transmission O&M cost summation for each of the "O&M" and "Transmission" row entries in the "SoCalGas" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SoCalGas O&M for transmission labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SoCalGas transmission allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpapers and are summarized in Table 3 in the SoCalGas and SDG&E O&M Summaries following this workpaper.

Schedule

The O&M expenditures in Table 2 below are based on the installation schedules and in-service assets placement for fiber, methane detection and PIM buildout as delineated in Table 1 of each-sub workpaper; and the annual costs as-computed in Table 5; which are allocated to SDG&E O&M in Table 6 under the schedules presented in Table(s) 7 of those same workpapers. Table 3 below provides a summary of O&M allocations for all Technology elements, by company and FERC designation, as derived or noted in Tables 7a and b in each Technology Element sub-work paper.

Table 2 Cost Summary for O&M by Technology Type

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
ROW FIBER OPTIC							0.2
DIRECT LABOR	0.0	0.0	0.0	0.0	0.0	0.1	0.1
DIRECT NON-LABOR	0.0	0.0	0.0	0.0	0.0	0.1	0.1
METHANE DETECTORS							0.1
DIRECT LABOR	-	0.0	0.0	0.0	0.0	0.0	0.1
DIRECT NON-LABOR	-	0.0	0.0	0.0	0.0	0.0	0.1
PIM							0.7
DIRECT LABOR	0.0	0.0	0.1	0.1	0.2	0.3	0.5
DIRECT NON-LABOR	-	-	0.0	0.0	0.1	0.2	0.3

PLAN TOTALS-O&M							1.0
DIRECT LABOR	0.0	0.0	0.1	0.1	0.2	0.4	0.6
DIRECT NON-LABOR	0.0	0.0	0.0	0.0	0.1	0.3	0.4

Detailed Work Paper	Testimony Reference
FIBER	VI.B & IX.C.2
METHANE	VI.C & IX.C.2
PIM	VI.D & IX.C.2

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE SDG&E Summary of Technology O&M, Including Enterprise Polling System	FERC ACCT. 859.1 & 874.4
WITNESS Joseph Rivera	

Table 3 Cost Allocation by FERC Account

	Company Split %	% FERC 874.4	% FERC 859.1	Allocation Method Summary
FIBER OPTIC				
SDGE	12			It is the company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles for & operating above 200 psig
SoCalGas	88			
Dist		0		
Trans			100	100% transmission
METHANE DETECTORS				
SDGE	12			It is the company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles for & operating above 200 psig
SoCalGas	88			
Dist		25		It is ratio of DOT transmission pipelines miles operated by distribution or transmission relative to the total pipelines miles to be monitored.
Trans			75	
PIM				
SDGE	12			It is the company ratio of 12" and greater in diameter of Class 3 transmission pipeline miles for & operating above 200 psig
SoCalGas	88			
Dist		25		It is ratio of DOT transmission pipelines miles operated by distribution or transmission relative to the total pipelines miles to be monitored.
Trans			75	

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE SDG&E Transmission Technology O&M	FERC ACCT. 859.1
WITNESS Joseph Rivera	

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.0	0.0	0.1	0.1	0.2	0.3	0.5
DIRECT NON-LABOR	0.0	0.0	0.0	0.0	0.1	0.2	0.3
TOTAL DIRECT O&M	0.0	0.0	0.1	0.1	0.2	0.6	0.8

Project Description

This workpaper provides a summary of all Technology Plan O&M costs allocated to SDG&E Transmission FERC account 859.1.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic ", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SoCalGas O&M work associated with the three Technology Plan Elements. Table 2 below provides the SoCalGas transmission O&M cost summation for each of the "O&M" and "Transmission" row entries in the "SoCalGas" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SoCalGas O&M for transmission labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SoCalGas transmission allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpapers and are summarized in Table 3 in the SoCalGas and SDG&E O&M Summaries following this workpaper.

Schedule

The O&M expenditures in Table 2 below are based on the installation schedule delineated in Table 1 of each sub-workpaper and the annual costs computed in Table 5; which are allocated to SDG&E Transmission O&M in Table 6 under the schedules presented in Tables 7a and 7b of those same workpapers.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE SDG&E Transmission Technology O&M	FERC ACCT. 859.1
WITNESS Joseph Rivera	

TABLE 2 Cost Summary by Technology Type

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
FIBER OPTIC							0.2
DIRECT LABOR	0.0	0.0	0.0	0.0	0.0	0.1	0.1
DIRECT NON-LABOR	0.0	0.0	0.0	0.0	0.0	0.1	0.1
METHANE DETECTORS							0.1
DIRECT LABOR	-	0.0	0.0	0.0	0.0	0.0	0.0
DIRECT NON-LABOR	-	0.0	0.0	0.0	0.0	0.0	0.0
PIM							0.5
DIRECT LABOR	0.0	0.0	0.0	0.0	0.1	0.2	0.3
DIRECT NON-LABOR	-	-	0.0	0.0	0.1	0.2	0.2

PLAN TOTALS-O&M							0.8
DIRECT LABOR	0.0	0.0	0.1	0.1	0.2	0.3	0.5
DIRECT NON-LABOR	0.0	0.0	0.0	0.0	0.1	0.2	0.3

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE SDG&E Distribution Technology O&M	FERC ACCT. 874.4
WITNESS Joseph Rivera	

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.0	0.0	0.0	0.0	0.0	0.1	0.1
DIRECT NON-LABOR	-	0.0	0.0	0.0	0.0	0.1	0.1
TOTAL DIRECT O&M	0.0	0.0	0.0	0.0	0.1	0.1	0.2

Project Description

This workpaper provides a summary of all Technology Plan O&M costs allocated to SDG&E Distribution FERC account 874.4.

Forecast Methodology

Sub-workpapers "Tech_1_Fiberoptic ", "Tech_2_Methane", and Tech_3_PIM" provide the basic cost information and Company and FERC allocations for all SoCalGas O&M work associated with the three Technology Plan Elements. Table 2 below provides the SoCalGas transmission O&M cost summation for each of the "O&M" and "Transmission" row entries in the "SoCalGas" sub-section of Table 6 of those respective sub-workpapers. Table 6 totals for SoCalGas O&M for transmission labor and non-labor in each Plan Year are shown below in Table 2 for each Element, as well as the Plan Totals for the SoCalGas transmission allocation. Company and FERC allocations are presented in Tables 7a and 7b of those sub workpapers and are summarized in Table 3 in the SoCalGas and SDG&E O&M Summaries following this workpaper.

Schedule

The O&M expenditures in Table 2 below are based on the installation schedule delineated in Table 1 of each sub-workpaper and the annual costs computed in Table 5; which are allocated to SDG&E Distribution O&M in Table 6 under the schedules presented in Tables 7a and 7b of those same workpapers.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE SDG&E Distribution Technology O&M	FERC ACCT. 874.4
WITNESS Joseph Rivera	

TABLE 2 Cost Summary by Technology Type

PROJECT COST (\$000,000 IN 2011\$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
FIBER OPTIC							-
DIRECT LABOR	-	-	-	-	-	-	-
DIRECT NON-LABOR	-	-	-	-	-	-	-
METHANE DETECTORS							0.0
DIRECT LABOR	-	0.0	0.0	0.0	0.0	0.0	0.0
DIRECT NON-LABOR	-	0.0	0.0	0.0	0.0	0.0	0.0
PIM							0.2
DIRECT LABOR	0.0	0.0	0.0	0.0	0.0	0.1	0.1
DIRECT NON-LABOR	-	-	0.0	0.0	0.0	0.1	0.1
PLAN TOTALS-O&M							0.2
DIRECT LABOR	0.0	0.0	0.0	0.0	0.0	0.1	0.1
DIRECT NON-LABOR	-	0.0	0.0	0.0	0.0	0.1	0.1

**FIBER OPTICS WORKPAPER
FOR BOTH CAPITAL AND OPERATIONS AND MAINTENANCE**

PSEP - Technology Plan Capital and O&M Detailed Data	Workpaper Title: <i>Tech_1_Fiber optic</i>
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Technology Description:	Determine in near real-time when pipeline right-of-way experiences intrusion, soil compaction, dig in or other phenomenon which alters the signal characteristics of a fiber optic communication line permanently deployed over high pressure gas transmission lines.									
Technology Purpose:	Detect when pipeline ROW has been accessed or impacted. Determine if digging and or rupture has occurred.									
Technology Scope of Installation:	All future new SDGE and SCG pipelines greater than 10" in diameter operating at greater than 20% of SMYS and at least a contiguous mile in length. Based on this criteria and under the proposed scope of the PSEP this equates to 276 miles. Some deviation based on other pipeline risk hazards including freeway, bridges, fault lines and significant population density and facility type along pipeline route. Total units to be installed: 276 miles equivalent over ten-year period. All new large dia pipelines will be equipped with FO direct buried cabling. In addition, there will be fiber optic stations deployed at approximately every 15-mile intervals of installed contiguous fiber optic cable.									
Unit/Device definition	One stretch of Fiber extending between valves at 15 mile increments. Include devices for interpreting fiber signal changes. Alarms to report into host system for forward to operations.									
Device Description Model/Mfg.	Fiber Optic (FO) stations to send & receive FO signals and 15 miles of direct buried fiber.			Plant Capital Code		Expense Code O&C.				
Base Device Cost:	\$ 150,000	miles or devisor for base equipment.	15.00							
Communications device:	Employ SCG and SDGE radio systems for communications. Modem costs included in radio system upgrade estimates. IT data collection system capital upgrade and maintenance costs not included in in this cost estimate. Operations field labor included in O&M totals.									

TABLE 1 CAPITAL INSTALLATION SCHEDULE

Installation Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Miles of new pipe installed	55	55	55	57	9	9	9	9	9	9	276
		110	165	222	231	240	249	258	267	276	Cumulative

Overview of Basic Assumptions and factors used for capital cost estimations used in Table 2 and 3: Fiber optic system costs based on quotation from vendor. Included in based cost are two fiber optic cables per installation and monitoring communications units every 15 miles. Cost of fiber installation based on SCG and SDG&E estimates for incremental work to lay fiber optic cabling during construction or repair of major pipeline sections. Miles estimates above are based on expected pipeline replacements of segments greater than 1 mile length as part of the PSEP. Fiber pipelines other than PSEP related work will also be included in future fiber optic monitoring plans but those costs will be included with base cost for those facilities and are not included in this plan estimate.

Table 2 SINGLE UNIT CAPITAL COSTS (Installed and Commissioned per mile)

Element	Rates/hr or qnty.	hours or qnty.	Sub total	Assumptions/notes on line item
Labor Project Planning/Admin.	\$ 52.88	20	\$ 1,057.69	proj mgmt
Permit and/or citing	\$ 200.00	1	\$ 200.00	
Labor union install/config.	\$ 41.36	40	\$ 1,654.40	Inst tech
Contracting costs	\$ 63,000	1	\$ 63,000.00	incremental per mile costs construction to install fiber and facilities open row.
Labor QA/test/ config:	\$ 44.13	16	\$ 706.08	
Unit purchase inc tax/ship/hndl	\$ 11,500.00	1	\$ 11,500.00	75k for fiber station at mlvx2 each 15 miles
Other Materials/encl/mount.	\$ 8,800	2	\$ 17,600.00	fiber cost per mile x 2 separate cables.
Communication Device	\$ 500.00	2	\$ 1,000.00	included in radio modem and telco
Host system confirmation - Labor	\$ 44.13	4	\$ 176.52	Sr inst tech
Host system bridge to corp - Labor	\$ 44.13	1	\$ 44.13	Sr inst tech
TOTAL			\$ 96,938.82	
			\$ 3,638.82 labor	
			93,300.00 non-labor	

Table 3 CAPITAL COST BY YEAR- DIRECT

Installation Year	Table 3: Cost Computation Method: Table 1 miles multiplied by unit capital cost in Table 2 per each year										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	TOTAL
Capital Cost	\$ 5,331,635	\$ 5,331,635	\$ 5,331,635	\$ 5,525,513	\$ 872,449	\$ 872,449	\$ 872,449	\$ 872,449	\$ 872,449	\$ 872,449	\$ 26,755,115
Labor	\$ 200,135	\$ 200,135	\$ 200,135	\$ 207,413	\$ 32,749	\$ 32,749	\$ 32,749	\$ 32,749	\$ 32,749	\$ 32,749	\$ 1,004,315
non-labor	\$ 5,131,500	\$ 5,131,500	\$ 5,131,500	\$ 5,318,100	\$ 839,700	\$ 839,700	\$ 839,700	\$ 839,700	\$ 839,700	\$ 839,700	\$ 25,750,800

Overview of Basic Assumptions for O&M cost computation for single units in Table 4 and annual costs in Table 5. Based on O&M costs incurred to support fiber optic communications and control and monitor assets of comparable complexity. Eight hours per year per mile technician time to perform routine maintenance and calibration of electronic devices to read fiber, to diagnose alarm signals and to respond to intrusion alarms. Cost allowense to repair fiber also included.

**FIBER OPTICS WORKPAPER
FOR BOTH CAPITAL AND OPERATIONS AND MAINTENANCE**

Table 4 UNIT OPERATING AND MAINTENANCE COSTS PER YEAR.

O&M Costs/per unit (mile)	Rates/hrs or		Sub total	Assumptions/notes on line item
	qnty.	hours or qnty.		
Union labor - maint	\$ 44.13	4	\$ 176.52	collection and alarm management system costs not included mileage and misc parts \$10 per month per site
Mgmt Labor - prog mgmt	\$ 52.88	2	\$ 105.77	
Union labor - troubleshoot/rep	\$ 41.36	2	\$ 82.72	
Non-labor (misc materials/exp)	\$ 50.00	1	\$ 50.00	
Location Fee	\$ -	0	\$ -	
Utility power	\$ 10.00	12	\$ 120.00	
User fee for monitoring	\$ 10.00	12	\$ 120.00	
Revenue (shared fiber row)	\$ -	0	\$ -	
TOTAL			\$ 655.01	

\$ 365.01 labor
\$ 290.00 non-labor

Table 5 Cost Computation Method: Table 1 miles multiplied by unit operating costs in Table 4

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	TOTAL
O&M costs	\$ 36,026	\$ 72,051	\$ 108,077	\$ 145,412	\$ 151,307	\$ 157,202	\$ 163,097	\$ 168,992	\$ 174,887	\$ 180,783	\$ 1,357,834
Labor	\$ 20,076	\$ 40,151	\$ 60,227	\$ 81,032	\$ 84,317	\$ 87,602	\$ 90,887	\$ 94,172	\$ 97,457	\$ 100,743	\$ 756,664
Non-labor	\$ 15,950	\$ 31,900	\$ 47,850	\$ 64,380	\$ 66,990	\$ 69,600	\$ 72,210	\$ 74,820	\$ 77,430	\$ 80,040	\$ 601,170

**Summary of Cost Allocation
Method/Rationale**

Method: Table 6 allocations below are taken by multiplying total costs from Tables 3 and 5 above for Capital and O&M, respectively, for each year by the percentages shown below under Table 7b Allocations and Split by Company to arrive at the specific company cost by year and FERC account (dist/trans).

Allocation Rationale: Based on the ratio of total pipeline miles expected to be monitored by each companies as percentage of total. Table 7a provides the relative mileage mix used to arrive at this value.

Table 6 Allocation of Costs to Company and FERC Accounts

		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	TOTAL
SDG&E												
Transmission		\$ 647,747	\$ 652,094	\$ 656,441	\$ 684,343	\$ 123,543	\$ 124,254	\$ 124,965	\$ 125,677	\$ 126,388	\$ 127,100	\$ 3,392,552
	Capital	\$ 643,399	\$ 643,399	\$ 643,399	\$ 666,796	\$ 105,284	\$ 105,284	\$ 105,284	\$ 105,284	\$ 105,284	\$ 105,284	\$ 3,228,694
	Labor	\$ 24,151	\$ 24,151	\$ 24,151	\$ 25,030	\$ 3,952	\$ 3,952	\$ 3,952	\$ 3,952	\$ 3,952	\$ 3,952	
	Non-labor	\$ 619,248	\$ 619,248	\$ 619,248	\$ 641,766	\$ 101,331	\$ 101,331	\$ 101,331	\$ 101,331	\$ 101,331	\$ 101,331	
	O&M	\$ 4,347	\$ 8,695	\$ 13,042	\$ 17,548	\$ 18,259	\$ 18,971	\$ 19,682	\$ 20,393	\$ 21,105	\$ 21,816	\$ 163,858
	Labor	\$ 2,423	\$ 4,845	\$ 7,268	\$ 9,779	\$ 10,175	\$ 10,571	\$ 10,968	\$ 11,364	\$ 11,761	\$ 12,157	
	Non-labor	\$ 1,925	\$ 3,850	\$ 5,774	\$ 7,769	\$ 8,084	\$ 8,399	\$ 8,714	\$ 9,029	\$ 9,344	\$ 9,659	
Distribution		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Capital	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Non-labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Non-labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
SoCalGas												
Transmission		\$ 4,719,914	\$ 4,751,592	\$ 4,783,270	\$ 4,986,582	\$ 900,214	\$ 905,398	\$ 910,581	\$ 915,765	\$ 920,949	\$ 926,132	\$ 24,720,397
	Capital	\$ 4,688,236	\$ 4,688,236	\$ 4,688,236	\$ 4,858,717	\$ 767,166	\$ 767,166	\$ 767,166	\$ 767,166	\$ 767,166	\$ 767,166	\$ 23,526,420
	Labor	\$ 175,984	\$ 175,984	\$ 175,984	\$ 182,383	\$ 28,797	\$ 28,797	\$ 28,797	\$ 28,797	\$ 28,797	\$ 28,797	
	Non-labor	\$ 4,512,252	\$ 4,512,252	\$ 4,512,252	\$ 4,676,334	\$ 738,369	\$ 738,369	\$ 738,369	\$ 738,369	\$ 738,369	\$ 738,369	
	O&M	\$ 31,678	\$ 63,356	\$ 95,034	\$ 127,864	\$ 133,048	\$ 138,232	\$ 143,415	\$ 148,599	\$ 153,783	\$ 158,966	\$ 1,193,976
	Labor	\$ 17,653	\$ 35,306	\$ 52,959	\$ 71,253	\$ 74,142	\$ 77,031	\$ 79,919	\$ 82,808	\$ 85,697	\$ 88,585	
	Non-labor	\$ 14,025	\$ 28,050	\$ 42,076	\$ 56,611	\$ 58,906	\$ 61,201	\$ 63,496	\$ 65,791	\$ 68,086	\$ 70,381	
Distribution		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Capital	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Non-labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Non-labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

**FIBER OPTICS WORKPAPER
FOR BOTH CAPITAL AND OPERATIONS AND MAINTENANCE**

Total Capital \$ 26,755,115

Total O&M \$ 1,357,834

Table 7a--Company Allocation Derivation

	SDGE	SCG
pipeline miles CL III gt 12", 200+ psig	150.00	1093.00
% of utility total	0.1207	0.8793
Total O&M		
Total Capital		

**Table 7b
Cost Allocation by Company and FERC Account**

Allocations	%
Transmission	100.00%
Distribution	0.00%
Split by Company	
SDG&E	12.07%
SCG	87.93%

**METHANE DETECTOR WORKPAPER
FOR BOTH CAPITAL AND OPERATIONS AND MAINTENANCE**

PSEP - Technology Plan Capital and O&M Detailed Data	Workpaper Title: Tech_2_Methane
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Technology Description:	Install Methane detectors along high pressure Rights-of-Way (ROW). Small units to provide 100 ppm or less gas detection. Mount above ground in Class III locations and in critical pipeline locations subject to damag. Units to initiate inbound communication to host computer system and provide notification to operations personnel with latency of less than 10 minutes.
Technology Purpose:	Provide near real time infomation to operations personnel to when natural gas is detected in the atmosphere along major high pressure pipeline right of ways.
Technology Scope of Installation:	All SDGE and SCG Class III pipeline locations with pipeline operating pressures above 200 psig and diameters 12 " or greater of pipelines: Schools/conve homes and hospitals, schools, event centers, malls, theaters, deploy where following facilities are within 200 yards. Some deviation based on other considerations such as pipeline adjacencies, geographic risk, pipe vintage and potential for 3rd party damage. Expected scope: 1000 miles of pipeline intermittent coverage with 2000 units installed.
Unit/Device definition	One methane detection unit installed in one fixed location covering 1/5 mile of pipe. ROW.
Device Description Model/Mfg.	Methane Gas Detector
Base Device Cost:	\$ 2,100.00
Communications device:	Unlicensed 900 MHz mesh radio (cost included in AMI system costs)

TABLE 1 CAPITAL INSTALLATION SCHEDULE

Installation Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Units installed in year	0	200	400	200	200	200	200	200	200	200	2000
		200	600	800	1,000	1,200	1,400	1,600	1,800	2,000	Cumulative

Overview of Basic Assumptions and factors used for capital cost estimations used in Table 2 and 3: Each of 100 locations provided with remote radio communications: Cost for radio modems provided by radio system mfg and assumes 2-way comm modules. Cost for installation and maintenance is based on utility projections for design and installation of each site including site survey and purchase of minor equipment to mount and, where possible provide auxiliary power to communications modules. These low cost installations will not provide continuous polling of the sites, but provide exception alarming and the ability to poll alarming devices for short periods to get limited real-time data for up to 30 minutes. Data to be capable of transmission includes pressure, rate of pressure drop, valve status (open/close) and battery power level.

Table 2 SINGLE UNIT CAPITAL COSTS (Installed and Commissioned)

Element	Rates/hr or		Sub total	Assumptions/notes on line item
	qnty.	hours or qnty.		
Labor Project Planning/Admin.	\$ 52.88	4	\$ 211.54	
Permit and/or site fee	\$ 200.00	1	\$ 200.00	
Labor union install/config.	\$ 44.13	2	\$ 88.26	Permits or incentive for locating on their premise
Labor contract	\$ 50.00	16	\$ 800.00	
Labor QA/test/ config:	\$ 44.13	1	\$ 44.13	
Unit purchase inc tax/ship/hndl	\$ 2,415.00	1	\$ 2,415.00	
Other Materials/encl/mount.	\$ 500.00	1	\$ 500.00	6 watt peaksolar powered with battery where electric power is not option
Communication Device	\$ 500.00	1	\$ 500.00	Included in AMI radio estimate
Host system confirmation lab	\$ 52.88	1	\$ 52.88	labor
Other				
TOTAL			\$ 4,811.81	
			\$ 396.81	labor
			\$ 4,415.00	non-labor

Table 3 CAPITAL COST BY YEAR- DIRECT

Installation Year	Table 3: Cost Computation Method:										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Capital Cost	\$ -	\$ 962,363	\$ 1,924,725	\$ 962,363	\$ 962,363	\$ 962,363	\$ 962,363	\$ 962,363	\$ 962,363	\$ 962,363	\$ 9,623,626
Labor	\$ -	\$ 79,363	\$ 158,725	\$ 79,363	\$ 79,363	\$ 79,363	\$ 79,363	\$ 79,363	\$ 79,363	\$ 79,363	\$ 793,626
non-labor	\$ -	\$ 883,000	\$ 1,766,000	\$ 883,000	\$ 883,000	\$ 883,000	\$ 883,000	\$ 883,000	\$ 883,000	\$ 883,000	\$ 8,830,000

Overview of Basic Assumptions for O&M cost computation for single units in Table 4 and annual costs in Table 5. Based on IT similar to comparable systems

Table 4 UNIT OPERATING AND MAINTENANCE COSTS PER YEAR.

O&M Costs/per unit	Rates/hrs or		Sub total	Assumptions/notes on line item
	qnty.	hours or qnty.		
Union labor - batt change/elect	\$ 41.36	0.2	\$ 8.27	battery change or electric system check
Mgmt Labor -prog mgmt	\$ 52.88	0.2	\$ 10.58	Program manager labor
Union labor - troubleshoot/rep	\$ 44.13	0.5	\$ 22.07	Technician labor
Non-labor (comm-contract)	\$ -	0	\$ -	Included in AMI prog costs
Location Fee	\$ 2.00	12	\$ 24.00	\$5 per month per site for 40% of sites.
battery at 5 years nl	\$ 20.00	1	\$ 20.00	utility electric or battery change
Other 3	\$ -	0	\$ -	n/a
Other 4	\$ -	0	\$ -	n/a
TOTAL			\$ 84.91	
			\$ 40.91	labor
			\$ 44.00	non-labor

**METHANE DETECTOR WORKPAPER
FOR BOTH CAPITAL AND OPERATIONS AND MAINTENANCE**

**Table 5
Operating and Maintenance Cost by Year -
Direct**

Table 5 Cost Computation Method: Extracted from Table 7 including Labor and non-labor.

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
O&M costs	\$ -	\$ 16,983	\$ 50,948	\$ 67,931	\$ 84,914	\$ 101,897	\$ 118,879	\$ 135,862	\$ 152,845	\$ 169,828	\$ 900,088
Labor	\$ -	\$ 8,183	\$ 24,548	\$ 32,731	\$ 40,914	\$ 49,097	\$ 57,279	\$ 65,462	\$ 73,645	\$ 81,828	\$ 433,688
Non-labor	\$ -	\$ 8,800	\$ 26,400	\$ 35,200	\$ 44,000	\$ 52,800	\$ 61,600	\$ 70,400	\$ 79,200	\$ 88,000	\$ 466,400

**Summary of Cost Allocation
Method/Rationale**

Method: Table 6 allocations below are taken by multiplying total costs from Tables 3 and 5 above for Capital and O&M, respectively, for each year by the percentages shown below under Table 7b "Allocations" and "Split by Company" to arrive at the specific company cost by year and FERC account (dist/trans). Allocation Rationale: Based on the ratio of total pipeline miles expected to be monitored by each companies as percentage of total. Table 7a provides the relative mileage mix used to arrive at this value.

**Table 6
Allocation of Costs to Company and FERC Accounts**

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	TOTAL
SDG&E	\$ -	\$ 118,183	\$ 238,416	\$ 124,332	\$ 126,381	\$ 128,430	\$ 130,480	\$ 132,529	\$ 134,579	\$ 136,628	\$ 1,269,957
Transmission	\$ -	\$ 88,637	\$ 178,812	\$ 93,249	\$ 94,786	\$ 96,323	\$ 97,860	\$ 99,397	\$ 100,934	\$ 102,471	\$ 952,468
Capital	\$ -	\$ 87,100	\$ 174,201	\$ 87,100	\$ 87,100	\$ 87,100	\$ 87,100	\$ 87,100	\$ 87,100	\$ 87,100	\$ 871,004
Labor	\$ -	\$ 7,183	\$ 14,366	\$ 7,183	\$ 7,183	\$ 7,183	\$ 7,183	\$ 7,183	\$ 7,183	\$ 7,183	\$ 7,183
Non-labor	\$ -	\$ 79,918	\$ 159,835	\$ 79,918	\$ 79,918	\$ 79,918	\$ 79,918	\$ 79,918	\$ 79,918	\$ 79,918	\$ 79,918
O&M	\$ -	\$ 1,537	\$ 4,611	\$ 6,148	\$ 7,685	\$ 9,222	\$ 10,759	\$ 12,296	\$ 13,834	\$ 15,371	\$ 81,464
Labor	\$ -	\$ 741	\$ 2,222	\$ 2,962	\$ 3,703	\$ 4,444	\$ 5,184	\$ 5,925	\$ 6,665	\$ 7,406	\$ 7,406
Non-labor	\$ -	\$ 796	\$ 2,389	\$ 3,186	\$ 3,982	\$ 4,779	\$ 5,575	\$ 6,372	\$ 7,168	\$ 7,965	\$ 7,965
Distribution	\$ -	\$ 29,546	\$ 59,604	\$ 31,083	\$ 31,595	\$ 32,108	\$ 32,620	\$ 33,132	\$ 33,645	\$ 34,157	\$ 317,489
Capital	\$ -	\$ 29,033	\$ 58,067	\$ 29,033	\$ 29,033	\$ 29,033	\$ 29,033	\$ 29,033	\$ 29,033	\$ 29,033	\$ 290,335
Labor	\$ -	\$ 2,394	\$ 4,789	\$ 2,394	\$ 2,394	\$ 2,394	\$ 2,394	\$ 2,394	\$ 2,394	\$ 2,394	\$ 2,394
Non-labor	\$ -	\$ 26,639	\$ 53,278	\$ 26,639	\$ 26,639	\$ 26,639	\$ 26,639	\$ 26,639	\$ 26,639	\$ 26,639	\$ 26,639
O&M	\$ -	\$ 512	\$ 1,537	\$ 2,049	\$ 2,562	\$ 3,074	\$ 3,586	\$ 4,099	\$ 4,611	\$ 5,124	\$ 27,155
Labor	\$ -	\$ 247	\$ 741	\$ 987	\$ 1,234	\$ 1,481	\$ 1,728	\$ 1,975	\$ 2,222	\$ 2,469	\$ 2,469
Non-labor	\$ -	\$ 265	\$ 796	\$ 1,062	\$ 1,327	\$ 1,593	\$ 1,858	\$ 2,124	\$ 2,389	\$ 2,655	\$ 2,655
SoCalGas	\$ -	\$ 861,162	\$ 1,737,258	\$ 905,962	\$ 920,896	\$ 935,829	\$ 950,762	\$ 965,696	\$ 980,629	\$ 995,562	\$ 9,253,756
Transmission	\$ -	\$ 645,872	\$ 1,302,943	\$ 679,472	\$ 690,672	\$ 701,872	\$ 713,072	\$ 724,272	\$ 735,472	\$ 746,672	\$ 6,940,317
Capital	\$ -	\$ 634,672	\$ 1,269,343	\$ 634,672	\$ 634,672	\$ 634,672	\$ 634,672	\$ 634,672	\$ 634,672	\$ 634,672	\$ 6,346,716
Labor	\$ -	\$ 52,339	\$ 104,678	\$ 52,339	\$ 52,339	\$ 52,339	\$ 52,339	\$ 52,339	\$ 52,339	\$ 52,339	\$ 52,339
Non-labor	\$ -	\$ 582,332	\$ 1,164,665	\$ 582,332	\$ 582,332	\$ 582,332	\$ 582,332	\$ 582,332	\$ 582,332	\$ 582,332	\$ 582,332
O&M	\$ -	\$ 11,200	\$ 33,600	\$ 44,800	\$ 56,000	\$ 67,200	\$ 78,400	\$ 89,600	\$ 100,800	\$ 112,000	\$ 593,602
Labor	\$ -	\$ 5,396	\$ 16,189	\$ 21,586	\$ 26,982	\$ 32,379	\$ 37,775	\$ 43,172	\$ 48,568	\$ 53,965	\$ 53,965
Non-labor	\$ -	\$ 5,804	\$ 17,411	\$ 23,214	\$ 29,018	\$ 34,821	\$ 40,625	\$ 46,428	\$ 52,232	\$ 58,035	\$ 58,035
Distribution	\$ -	\$ 215,291	\$ 434,314	\$ 226,491	\$ 230,224	\$ 233,957	\$ 237,691	\$ 241,424	\$ 245,157	\$ 248,891	\$ 2,313,439
Capital	\$ -	\$ 211,557	\$ 423,114	\$ 211,557	\$ 211,557	\$ 211,557	\$ 211,557	\$ 211,557	\$ 211,557	\$ 211,557	\$ 2,115,572
Labor	\$ -	\$ 17,446	\$ 34,893	\$ 17,446	\$ 17,446	\$ 17,446	\$ 17,446	\$ 17,446	\$ 17,446	\$ 17,446	\$ 17,446
Non-labor	\$ -	\$ 194,111	\$ 388,222	\$ 194,111	\$ 194,111	\$ 194,111	\$ 194,111	\$ 194,111	\$ 194,111	\$ 194,111	\$ 194,111
O&M	\$ -	\$ 3,733	\$ 11,200	\$ 14,933	\$ 18,667	\$ 22,400	\$ 26,133	\$ 29,867	\$ 33,600	\$ 37,333	\$ 197,867
Labor	\$ -	\$ 1,799	\$ 5,396	\$ 7,195	\$ 8,994	\$ 10,793	\$ 12,592	\$ 14,391	\$ 16,189	\$ 17,988	\$ 17,988
Non-labor	\$ -	\$ 1,935	\$ 5,804	\$ 7,738	\$ 9,673	\$ 11,607	\$ 13,542	\$ 15,476	\$ 17,411	\$ 19,345	\$ 19,345

Total Capital \$ 9,623,626

Total O&M \$ 900,088

Table 7a--Company Allocation Derivation

	SDGE	SCG
pipeline miles CL III gt 12", 200+ psig	150.00	1093.00
% of utility total	0.1207	0.8793
Total O&M		
Total Capital		

Table 7b

Cost Allocation by Company and FERC Account

Allocations	%
Transmission	75.00%
Distribution	25.00%
Split by Company	
SDG&E	12.07%
SCG	87.93%

**PIM WORKPAPER
FOR BOTH CAPITAL AND OPERATIONS AND MAINTENANCE**

PSEP - Technology Plan Capital and O&M Detailed Data	Workpaper Title: Tech 3_PIM
---	-----------------------------

Technology Description:	Enterprise data collection and management system to monitor pipeline ROW, intrusion, methane detection with future expansion to include pressure alarms remote CP alarms and acoustic monitoring of ROW
Technology Purpose:	To monitor events along pipeline's ROW which may indicate potential compromise of pipeline infrastructure
Technology Scope of Installation:	In-house development of new system capable of polling 10,000 remote field sensors alarming on problem conditions managing data and allow user access across enterprise.
Complete system definition	
Device Description Model/Mfg.	Custom developed IT system

TABLE 1 CAPITAL INSTALLATION SCHEDULE

Installation Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Units installed in year (assumes one site partially completed each year)	1	-	-	-	-	-	-	-	-	-	1
	1	1	1	1	1	1	1	1	1	1	Cumulative

Overview of basic assumptions and factors used for capital cost estimations used in Table 2 and 3: Costs are based on detail estimates provided by IT program managers who have developed comparable systems and taking in consideration prior system developments of similar scale and complexity. The proposed system will serve both SCG and SDG&E.

Table 2 SINGLE UNIT CAPITAL COSTS (Installed and Commissioned)

Element	Rates/hr or qnty. hours or qnty.	Sub total	Other assumptions/notes on line item	
Labor Project Planning/Admin. Permit and/or siting			See note above under Overview of Basic Assumptions	
Labor union install/config. Contract Services	n/a			
Labor QA/test/ config: Electronic Components				
Other Materials/encl/mount/nl				
Communication Devices				
Host system confirmation				
Electrical Power				
TOTAL		\$ -		
		\$ -		Total Labor
		\$ -		Total non-labor

Table 3 CAPITAL COST BY YEAR- DIRECT

Installation Year	Table 3: Cost Computation Method										TOTAL	
	2013	2014	2015	2016	2017	2018	2019	2020	2021			
Capital Cost	\$ 12,072,135	\$ 13,115,936	\$ 626,863	\$ 12,925	\$ -	\$ 1,327,240	\$ 1,078,383	\$ -	\$ -	\$ -	\$ -	28,233,481
Labor	\$ 2,548,494	3,078,194	604,068	12,455	-	124,429	-	-	-	-	-	6,367,638
non-labor	\$ 9,523,642	10,037,742	22,795	470	-	1,202,811	1,078,383	-	-	-	-	21,865,842

**PIM WORKPAPER
FOR BOTH CAPITAL AND OPERATIONS AND MAINTENANCE**

Overview of basic assumptions for O&M cost computation for single units in Table 4 and annual costs in Table 5. Based on IT similar to comparable systems

Table 4 UNIT OPERATING AND MAINTENANCE COSTS PER YEAR.

Capital Costs/per unit	Rates/hrs or qnty.	hours or qnty.	Sub total
Union labor - troubleshoot/rep			
Mgmt Labor -prog mgmt			
Union labor - routine maint		N/A	
Non-labor Location Fee electric power comm Other 2			
TOTAL			\$ -

See note above

\$ - labor
\$ - non-labor

Table 5 Operating and Maintenance Cost by Year - Direct

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Labor	300,439	261,416	756,370	731,720	670,780	670,780	670,780	670,780	670,780	670,780	6,074,623
Non-labor	-	-	274,780	294,780	294,780	294,780	294,780	294,780	294,780	294,780	2,338,238

**PIM WORKPAPER
FOR BOTH CAPITAL AND OPERATIONS AND MAINTENANCE**

**Summary of Cost Allocation
Method/Rationale**

Method: Table 6 allocations below are taken by multiplying total costs from Tables 3 and 5 above for Capital and O&M, respectively, for each year by the percentages shown below under Table 7b 'Allocations' and 'Split by Company' to arrive at the specific company cost by year and FERC account (dist/trans). Allocation Rationale: Based on the ratio of total pipeline miles expected to be monitored by each company as percentage of total. Table 7a provides the relative mileage mix used to arrive at this value. Allocations to transmission and distribution based on relative miles of transmission vs distribution pipeline miles to be monitor by the system.

Based on the ratio of total pipelines miles monitored by each companies as percentage of tot

Table 6 Allocation of Costs to Company and FERC Accounts

		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	TOTAL	
SDG&E													\$ 4,140,157
Transmission													\$ 2,555,323
	Capital Total	\$ 1,092,611	\$ 1,187,082	\$ 56,735	\$ 1,170	\$ -	\$ 120,124	\$ 97,601	\$ -	\$ -	\$ -	\$ -	\$ -
	Labor	\$ 230,656	\$ 278,598	\$ 54,672	\$ 1,127	\$ -	\$ 11,262	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Non-labor	\$ 861,955	\$ 908,484	\$ 2,063	\$ 43	\$ -	\$ 108,863	\$ 97,601	\$ -	\$ -	\$ -	\$ -	\$ -
	O&M Total	\$ 27,192	\$ 23,660	\$ 68,457	\$ 66,226	\$ 60,710	\$ 60,710	\$ 60,710	\$ 60,710	\$ 60,710	\$ 60,710	\$ 60,710	\$ 549,795
	Labor	\$ 27,192	\$ 23,660	\$ 43,587	\$ 39,546	\$ 34,031	\$ 34,031	\$ 34,031	\$ 34,031	\$ 34,031	\$ 34,031	\$ 34,031	\$ 34,031
	Non-labor	\$ -	\$ -	\$ 24,869	\$ 26,680	\$ 26,680	\$ 26,680	\$ 26,680	\$ 26,680	\$ 26,680	\$ 26,680	\$ 26,680	\$ 26,680
Distribution													\$ 851,774
	Capital Total	\$ 364,204	\$ 395,694	\$ 18,912	\$ 390	\$ -	\$ 40,041	\$ 32,534	\$ -	\$ -	\$ -	\$ -	\$ -
	Labor	\$ 76,885	\$ 92,866	\$ 18,224	\$ 376	\$ -	\$ 3,754	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Non-labor	\$ 287,318	\$ 302,828	\$ 688	\$ 14	\$ -	\$ 36,288	\$ 32,534	\$ -	\$ -	\$ -	\$ -	\$ -
	O&M Total	\$ 9,064	\$ 7,887	\$ 22,819	\$ 22,075	\$ 20,237	\$ 20,237	\$ 20,237	\$ 20,237	\$ 20,237	\$ 20,237	\$ 20,237	\$ 183,265
	Labor	\$ 9,064	\$ 7,887	\$ 14,529	\$ 13,182	\$ 11,344	\$ 11,344	\$ 11,344	\$ 11,344	\$ 11,344	\$ 11,344	\$ 11,344	\$ 11,344
	Non-labor	\$ -	\$ -	\$ 8,290	\$ 8,893	\$ 8,893	\$ 8,893	\$ 8,893	\$ 8,893	\$ 8,893	\$ 8,893	\$ 8,893	\$ 8,893
SoCalGas													\$ 30,167,947
Transmission													\$ 18,619,787
	Capital Total	\$ 7,961,491	\$ 8,649,870	\$ 413,412	\$ 8,524	\$ -	\$ 875,306	\$ 711,186	\$ -	\$ -	\$ -	\$ -	\$ -
	Labor	\$ 1,680,714	\$ 2,030,048	\$ 398,378	\$ 8,214	\$ -	\$ 82,060	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Non-labor	\$ 6,280,776	\$ 6,619,822	\$ 15,033	\$ 310	\$ -	\$ 793,246	\$ 711,186	\$ -	\$ -	\$ -	\$ -	\$ -
	O&M Total	\$ 198,138	\$ 172,402	\$ 498,821	\$ 482,564	\$ 442,375	\$ 442,375	\$ 442,375	\$ 442,375	\$ 442,375	\$ 442,375	\$ 442,375	\$ 4,006,173
	Labor	\$ 198,138	\$ 172,402	\$ 317,605	\$ 288,159	\$ 247,969	\$ 247,969	\$ 247,969	\$ 247,969	\$ 247,969	\$ 247,969	\$ 247,969	\$ 247,969
	Non-labor	\$ -	\$ -	\$ 181,215	\$ 194,405	\$ 194,405	\$ 194,405	\$ 194,405	\$ 194,405	\$ 194,405	\$ 194,405	\$ 194,405	\$ 194,405
Distribution													\$ 6,206,596
	Capital Total	\$ 2,653,830	\$ 2,883,290	\$ 137,804	\$ 2,841	\$ -	\$ 291,769	\$ 237,062	\$ -	\$ -	\$ -	\$ -	\$ -
	Labor	\$ 560,238	\$ 676,683	\$ 132,793	\$ 2,738	\$ -	\$ 27,353	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Non-labor	\$ 2,093,592	\$ 2,206,607	\$ 5,011	\$ 103	\$ -	\$ 264,415	\$ 237,062	\$ -	\$ -	\$ -	\$ -	\$ -
	O&M Total	\$ 66,046	\$ 57,467	\$ 166,274	\$ 160,855	\$ 147,458	\$ 147,458	\$ 147,458	\$ 147,458	\$ 147,458	\$ 147,458	\$ 147,458	\$ 1,335,391
	Labor	\$ 66,046	\$ 57,467	\$ 105,868	\$ 96,053	\$ 82,656	\$ 82,656	\$ 82,656	\$ 82,656	\$ 82,656	\$ 82,656	\$ 82,656	\$ 82,656
	Non-labor	\$ -	\$ -	\$ 60,405	\$ 64,802	\$ 64,802	\$ 64,802	\$ 64,802	\$ 64,802	\$ 64,802	\$ 64,802	\$ 64,802	\$ 64,802

Total Capital \$ 28,233,481

Total O&M \$ 6,074,623

Table 7a--Company Allocation Derivation

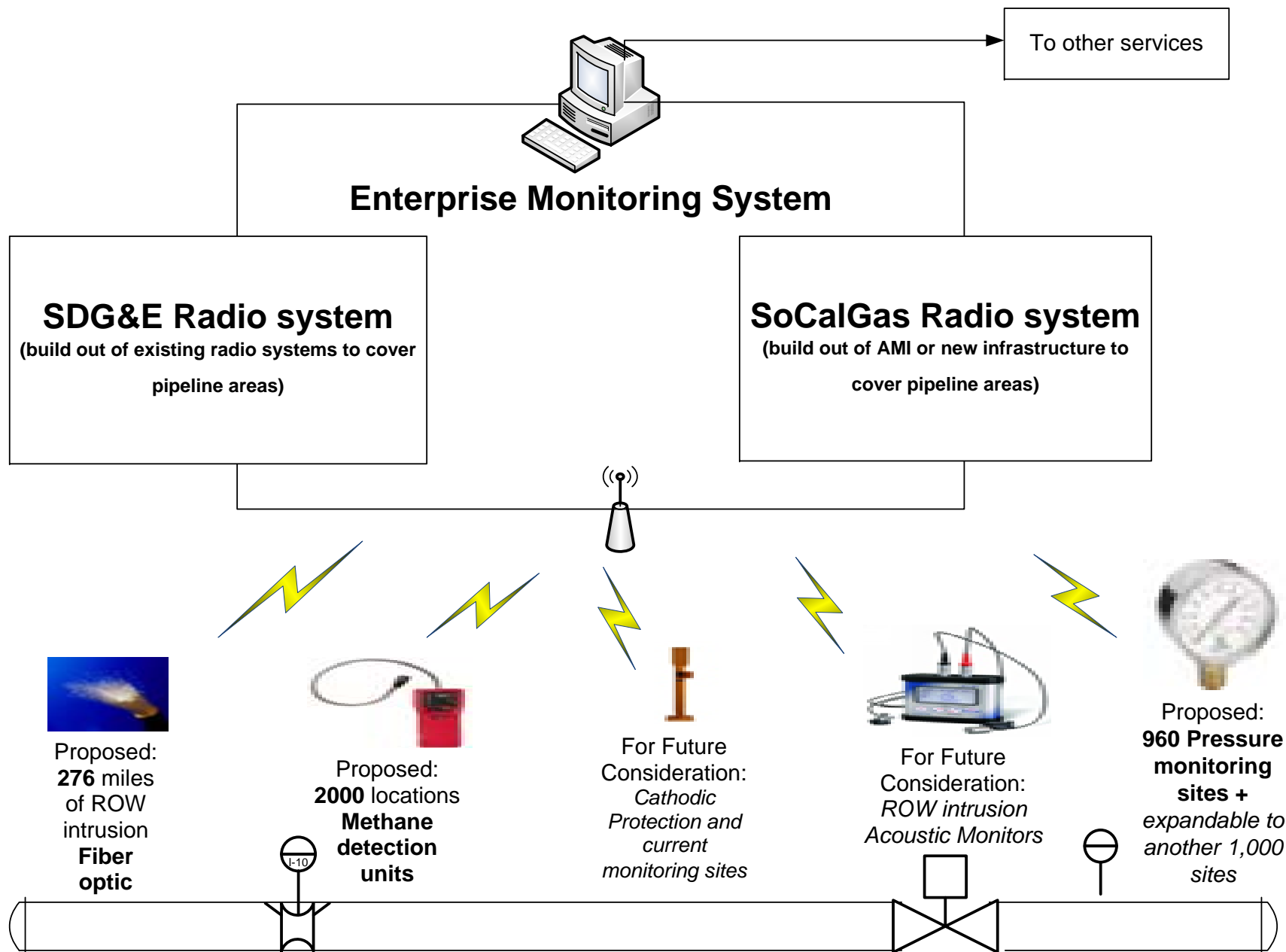
	SDGE	SCG
pipeline miles CL III gt 12", 200+ psig	150.00	1093.00
% of utility total	0.1207	0.8793

Table 7b

Cost Allocation by Company and FERC Account

Allocations	%
Transmission (367)	75.00%
Distribution (376)	25.00%
Split by Company	
SDG&E	12.07%
SCG	87.93%

OVERVIEW OF PIM TECHNOLOGY



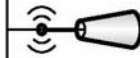
PIM-DCMS Functions



Enterprise Monitoring System

SDG&E Radio system

SoCalGas Radio system



Provide periodic (at minimum daily) health/status monitoring of all fiber optic and methane detection monitors by way of daily status reporting and remote data collection

Track alarm acknowledgement and status

Accommodate future expansion to 10,000 monitoring points and multiple sensor types

Receive alarm information initiated by any fiber optic or methane detection monitor with a latency of less than 2 minutes

Provide permanent storage of all events with appropriate time and date stamping of events

Provide for export/routing of information to support near real-time graphical viewing presentation of alarms on Company mapping products and provide connectivity with automated customer notification systems

Report alarms to appropriate dispatch personnel for review, call-out and resolution as required

Provide system-wide viewing of current alarm information to help field and operations personnel reconcile fiber optic and methane detection monitor information with SCADA and other field observations during an emergency situation

PIM – DCMS (Data Collection and Management Systems)

