CHAPTER IX COST WORKPAPERS
Witness: J. M. Rivera

Pipeline Safety Enhancement Plan
Pipeline Workpapers

SoCalGas Pipeline Workpapers

Workpapers	Testimony Section	Corresponding Testimony Tables	Workpaper Page
Pressure Testing	IX.B.1.a	IX-6	WP-IX-1-2
Pipe Replacement	IX.B.1.b	IX-7, IX-8	WP-IX-1-21
In-Line Inspection	IX.B.2	IX-9	WP-IX-1-38
Mitigation of Pre-1946 Construction Methods	IX.C.1	IX-14	WP-IX-1-44
Phase 2 Costs	IX.E	N/A	WP-IX-1-57

SDG&E Pipeline Workpapers

Workpapers	Testimony Section	Testimony Tables	Workpaper Page
Pressure Testing	IX.B.1.a	IX-6	WP-IX-1-14
Pipe Replacement	IX.B.1.b	IX-7, IX-8	WP-IX-1-31
In-Line Inspection	IX.B.2	IX-9	WP-IX-1-42
Mitigation of Pre-1946 Construction Methods	IX.C.1	IX-14	N/A[1]
Phase 2 Costs	IX.E	N/A	WP-IX-1-57

1. There were no costs associated with Mitigation of Pre-1946 Construction Methods at SDG&E, as the pipelines meeting this criteria are addressed in Phase 1A.

Please see page WP-IX-1-1 for a discussion on the Uniform System of Accounts (USofA).

Uniform System of Accounts Discussion

SoCalGas and SDG&E utilize the Commission's Uniform System of Accounts (USofA) as described in Code of Federal Regulations (CFR), Title 18, Part 201 "UNIFORM SYSTEM OF ACCOUNTS PRESCRIBED FOR NATURAL GAS COMPANIES SUBJECT TO THE PROVISIONS OF THE NATURAL GAS ACT".

The USofA provides basic account descriptions, instructions, and accounting definitions used to maintain the utilities' books and records. The USofA uses functional definitions to define the terms transmission, distribution and storage.

The scope of the PSEP is driven by pipeline safety and the stress level of the pipe as described in CFR, Title 49, Part 192 "TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS".

The safety regulations define the terms transmission, distribution and storage differently from the USA. As a result, the PSEP filing includes pipelines that are specified as transmission, distribution and storage per the USA, while addressing transmission pipeline from the safety perspective.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Summary of SoCalGas Pressure Testing	863 & 887
WITNESS	
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PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.0	1.4	1.4	1.4	5.1	-	5.1
DIRECT NON-LABOR	35.3	47.1	47.1	47.1	176.7	-	176.7
TOTAL DIRECT O&M	36.4	48.5	48.5	48.5	181.8	-	181.8

Project Description

Both the Proposed Case Pipeline Safety Enhancement Plan and the Base Case include estimated costs for SoCalGas to pressure test 176 miles of transmission pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SoCalGas utilized the assistance of a third party engineering firm, System Planning Engineering and Consulting Services (SPEC Services), to develop the cost estimates for pressure testing. These estimates include the costs for pressure testing not only these 176 miles of pipe, but also the mileage of adjoining segments that similarly lack sufficient documentation of pressure testing, but are located in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. In addition, a small number of other segments were included, as necessary, to facilitate continuity of the testing. In total, 361 miles of SoCalGas Transmission pipeline will be pressure tested in Phase 1 at a cost of $182 million.

Forecast Methodology

Pressure testing cost estimates were developed based on proposed pressure test mileage and certain pipeline system data, such as pipeline diameter, provided by SoCalGas and SDG&E to SPEC Services for each pipeline segment contained within the proposed scope of work. Estimating factors include segment size, pipeline profile, water supply, equipment, personnel, materials, etc. See Appendix D of Testimony for a more detailed description of the pressure testing cost estimating methodology and assumptions.

Please see the following workpapers for more details on the forecasting methodology for each area:
- SoCalGas Transmission Pressure Testing
- SoCalGas Distribution Pressure Testing
- SoCalGas Storage Pressure Testing

The costs shown in the table above include the costs for all pressure test projects scheduled for SoCalGas Transmission, SoCalGas Distribution, and SoCalGas Storage.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Summary of SoCalGas Pressure Testing	863 & 887
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The costs for each area are summarized below, shown in millions of 2011 dollars.

SoCalGas Transmission Pressure Testing

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.0	1.3	1.3	1.3	4.8	-	4.8
DIRECT NON-LABOR	34.5	46.0	46.0	46.0	172.3	-	172.3
TOTAL DIRECT O&M	35.4	47.2	47.2	47.2	177.1	-	177.1

SoCalGas Distribution Pressure Testing

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	0.1	-	0.1
DIRECT NON-LABOR	0.7	0.9	0.9	0.9	3.4	-	3.4
TOTAL DIRECT O&M	0.7	0.9	0.9	0.9	3.5	-	3.5

SoCalGas Storage Pressure Testing

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.0	0.1	0.1	0.1	0.2	-	0.2
DIRECT NON-LABOR	0.2	0.3	0.3	0.3	1.0	-	1.0
TOTAL DIRECT O&M	0.2	0.3	0.3	0.3	1.2	-	1.2

Schedule

SoCalGas' pressure test projects are scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 20% of the Phase 1 costs would occur in the first year (2012) and the remaining 80% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015).

Please see the following workpapers for more details on the project scheduling for each area:
- SoCalGas Transmission Pressure Testing
- SoCalGas Distribution Pressure Testing
- SoCalGas Storage Pressure Testing

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pressure Testing	863
WITNESS	
Joseph Rivera	

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.0	1.3	1.3	1.3	4.8	-	4.8
DIRECT NON-LABOR	34.5	46.0	46.0	46.0	172.3	-	172.3
TOTAL DIRECT O&M	35.4	47.2	47.2	47.2	177.1	-	177.1

Project Description

Both the Proposed Case Pipeline Safety Enhancement Plan and the Base Case include estimated costs for SoCalGas to pressure test 176 miles of transmission pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SoCalGas utilized the assistance of a third party engineering firm, System Planning Engineering and Consulting Services (SPEC Services), to develop the cost estimates for pressure testing. These estimates include the costs for pressure testing not only these 176 miles of pipe, but also the mileage of adjoining segments that similarly lack sufficient documentation of pressure testing, but are located in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. In addition, a small number of other segments were included, as necessary, to facilitate continuity of the testing. In total, 361 miles of SoCalGas Transmission pipeline will be pressure tested in Phase 1 at a cost of $182 million.

Forecast Methodology

Pressure testing cost estimates were developed based on proposed pressure test mileage and certain pipeline system data, such as pipeline diameter, provided by SoCalGas and SDG&E to SPEC Services for each pipeline segment contained within the proposed scope of work. Estimating factors include segment size, pipeline profile, water supply, equipment, personnel, materials, etc. See Appendix D of Testimony for a more detailed description of the pressure testing cost estimating methodology and assumptions.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pressure Testing	863
WITNESS	
Joseph Rivera	

The table below shows a summary of the pressure test projects for SoCalGas Transmission. The details and cost estimates for each of these pipelines can be found in Appendix IX-1-A.

Pipeline	Phase	Miles			Pressure Test Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
235 East	Phase 1A	0.620	0.280	0.900	7,700	1,027,100	1,034,800
235 West	Phase 1A	2.744	0.356	3.100	71,800	1,980,000	2,051,800
317	Phase 1A	1.571	-	2.100	7,700	433,200	440,900
404	Phase 1A	24.450	13.350	37.800	380,200	9,655,100	10,035,300
406	Phase 1A	7.863	12.838	20.700	285,600	7,253,000	7,538,600
407	Phase 1A	6.251	0.049	6.300	143,500	3,644,100	3,787,600
1004	Phase 1A	12.718	6.983	19.700	159,200	4,043,200	4,202,400
1005	Phase 1A	1.307	2.193	3.500	63,800	1,758,700	1,822,500
1013	Phase 1A	3.456	0.044	3.500	68,000	1,874,600	1,942,600
1020	Phase 1A	4.056	1.644	5.700	134,100	3,405,800	3,539,900
1024	Phase 1A	1.154	0.046	1.200	7,700	1,005,200	1,012,900
2000	Phase 1A	55.027	62.574	117.600	1,263,700	63,940,600	65,204,300
2001 East	Phase 1A	0.760	6.341	7.100	171,300	4,350,300	4,521,600
2001 West	Phase 1A	15.809	48.291	64.100	738,200	37,351,900	38,090,100
2003	Phase 1A	26.225	0.275	26.500	303,300	15,345,300	15,648,600
3000 East	Phase 1A	0.260	11.640	11.900	270,000	6,856,200	7,126,200
4000	Phase 1A	0.586	3.114	3.700	114,200	2,899,800	3,014,000
Total	All	164.854	170.017	335.400	4,190,000	166,824,100	171,014,100

Cost estimates are shown in 2011$.

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SoCalGas Transmission Pressure Testing	863
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Based on historical projects, it was estimated that an average of one repair would be needed for each pressure test segment, and the repairs would cost an average of $50,000 (10% labor and 90% non-labor) each. The table below shows the estimated cost for pipe repairs.

Pipeline	Phase	Estimated Pressure Test Segments	Estimated Repairs (1 Repair per Pressure Test Segment)	Pressure Test Repair Cost Estimate		
				Labor (10% of Total)	Non Labor (90% of Total)	Total ($50,000 / Repair)
235 East	Phase 1A	1	1	5,000	45,000	50,000
235 West	Phase 1A	1	1	5,000	45,000	50,000
317	Phase 1A	1	1	5,000	45,000	50,000
404	Phase 1A	13	13	65,000	585,000	650,000
406	Phase 1A	9	9	45,000	405,000	450,000
407	Phase 1A	2	2	10,000	90,000	100,000
1004	Phase 1A	7	7	35,000	315,000	350,000
1005	Phase 1A	3	3	15,000	135,000	150,000
1013	Phase 1A	2	2	10,000	90,000	100,000
1020	Phase 1A	2	2	10,000	90,000	100,000
1024	Phase 1A	1	1	5,000	45,000	50,000
2000	Phase 1A	37	37	185,000	1,665,000	1,850,000
2001 East	Phase 1A	3	3	15,000	135,000	150,000
2001 West	Phase 1A	25	25	125,000	1,125,000	1,250,000
2003	Phase 1A	10	10	50,000	450,000	500,000
3000 East	Phase 1A	4	4	20,000	180,000	200,000
4000	Phase 1A	1	1	5,000	45,000	50,000
Total	All	122	122	610,000	5,490,000	6,100,000

Cost estimates are shown in 2011$.

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WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pressure Testing	863
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For Phase 1A (2012 - 2015), it was estimated that approximately 20% of the funding would be needed in the first year, 2012, and the remaining 80% would be distributed over the years 2013 - 2015 (approximately 26.7% in each year). The table below shows the total labor and non-labor costs in millions. No pressure test projects are planned for SoCalGas Transmission in Phase 1B.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Phase 1A or 1B Costs	20%	27%	27%	27%	100%		
Labor	$ 1.0	$ 1.3	$ 1.3	$ 1.3	$ 4.8	$ -	$ 4.8
Non-Labor	$ 34.5	$ 46.0	$ 46.0	$ 46.0	$ 172.3	$ -	$ 172.3
Total	$ 35.4	$ 47.2	$ 47.2	$ 47.2	$ 177.1	$ -	$ 177.1

Costs in this table are shown in millions of 2011$.

Schedule

All SoCalGas Transmission pressure test projects are scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 20% of the costs would occur in the first year (2012) and the remaining 80% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015).

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WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pressure Testing	887
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	0.1	-	0.1
DIRECT NON-LABOR	0.7	0.9	0.9	0.9	3.4	-	3.4
TOTAL DIRECT O&M	0.7	0.9	0.9	0.9	3.5	-	3.5

Project Description

Both the Proposed Case Pipeline Safety Enhancement Plan and the Base Case include estimated costs for SoCalGas to pressure test 176 miles of transmission pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SoCalGas utilized the assistance of a third party engineering firm, System Planning Engineering and Consulting Services (SPEC Services), to develop the cost estimates for pressure testing. These estimates include the costs for pressure testing not only these 176 miles of pipe, but also the mileage of adjoining segments that similarly lack sufficient documentation of pressure testing, but are located in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. In addition, a small number of other segments were included, as necessary, to facilitate continuity of the testing. In total, 361 miles of SoCalGas Transmission pipeline will be pressure tested in Phase 1 at a cost of $182 million.

Forecast Methodology

Pressure testing cost estimates were developed based on proposed pressure test mileage and certain pipeline system data, such as pipeline diameter, provided by SoCalGas and SDG&E to SPEC Services for each pipeline segment contained within the proposed scope of work. Estimating factors include segment size, pipeline profile, water supply, equipment, personnel, materials, etc. See Appendix D of Testimony for a more detailed description of the pressure testing cost estimating methodology and assumptions.

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WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pressure Testing	887
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The table below shows a summary of the pressure test projects for SoCalGas Distribution. The details and cost estimates for each of these pipelines can be found in Appendix IX-1-B.

Pipeline	Phase	Miles			Pressure Test Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
33-121	Phase 1A	0.445	0.001	0.447	7,700	406,000	413,700
36-8-06	Phase 1A	0.577	-	0.577	7,700	189,800	197,500
36-1032	Phase 1A	1.165	0.390	1.555	7,700	297,700	305,400
38-528	Phase 1A	2.434	1.751	4.184	15,400	399,100	414,500
41-25	Phase 1A	0.121	-	0.121	7,700	191,100	198,800
41-90	Phase 1A	0.000		0.000	7,700	188,000	195,700
44-1008	Phase 1A	1.876	8.187	10.063	23,100	1,233,400	1,256,500
Total	All	6.619	10.329	16.948	77,000	2,905,100	2,982,100

Cost estimates are shown in 2011$.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pressure Testing	887
WITNESS	
Joseph Rivera	

Based on historical projects, it was estimated that an average of one repair would be needed for each pressure test segment, and the repairs would cost an average of $50,000 (10% labor and 90% non-labor) each. The table below shows the estimated cost for pipe repairs.

Pipeline	Phase	Estimated Pressure Test Segments	Estimated Repairs (1 Repair per Pressure Test Segment)	Pressure Test Repair Cost Estimate		
				Labor (10% of Total)	Non Labor (90% of Total)	Total ($50,000 / Repair)
33-121	Phase 1A	1	1	5,000	45,000	50,000
36-8-06	Phase 1A	1	1	5,000	45,000	50,000
36-1032	Phase 1A	1	1	5,000	45,000	50,000
38-528	Phase 1A	2	2	10,000	90,000	100,000
41-25	Phase 1A	1	1	5,000	45,000	50,000
41-90	Phase 1A	1	1	5,000	45,000	50,000
44-1008	Phase 1A	3	3	15,000	135,000	150,000
Total	All	10	10	50,000	450,000	500,000

Cost estimates are shown in 2011$.

For Phase 1A (2012 - 2015), it was estimated that approximately 20% of the funding would be needed in the first year, 2012, and the remaining 80% would be distributed over the years 2013 - 2015 (approximately 26.7% in each year). The table below shows the total labor and non-labor costs in millions. No pressure test projects are planned for SoCalGas Distribution in Phase 1B.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Phase 1A or 1B Costs	20%	27%	27%	27%	100%		
Labor	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.1	$ -	$ 0.1
Non-Labor	$ 0.7	$ 0.9	$ 0.9	$ 0.9	$ 3.4	$ -	$ 3.4
Total	$ 0.7	$ 0.9	$ 0.9	$ 0.9	$ 3.5	$ -	$ 3.5

Costs in this table are shown in millions of 2011$.

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WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pressure Testing	887
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Schedule

All SoCalGas Distribution pressure test projects are scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 20% of the costs would occur in the first year (2012) and the remaining 80% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015).

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WORKPAPER TITLE	FERC ACCT.
SoCalGas Storage Pressure Testing	837
WITNESS	
Joseph Rivera	

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.0	0.1	0.1	0.1	0.2	-	0.2
DIRECT NON-LABOR	0.2	0.3	0.3	0.3	1.0	-	1.0
TOTAL DIRECT O&M	0.2	0.3	0.3	0.3	1.2	-	1.2

Project Description

Both the Proposed Case Pipeline Safety Enhancement Plan and the Base Case include estimated costs for SoCalGas to pressure test 176 miles of transmission pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SoCalGas utilized the assistance of a third party engineering firm, System Planning Engineering and Consulting Services (SPEC Services), to develop the cost estimates for pressure testing. These estimates include the costs for pressure testing not only these 176 miles of pipe, but also the mileage of adjoining segments that similarly lack sufficient documentation of pressure testing, but are located in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. In addition, a small number of other segments were included, as necessary, to facilitate continuity of the testing. In total, 361 miles of SoCalGas Transmission pipeline will be pressure tested in Phase 1 at a cost of $182 million.

Forecast Methodology

Pressure testing cost estimates were developed based on proposed pressure test mileage and certain pipeline system data, such as pipeline diameter, provided by SoCalGas and SDG&E to SPEC Services for each pipeline segment contained within the proposed scope of work. Estimating factors include segment size, pipeline profile, water supply, equipment, personnel, materials, etc. See Appendix D of Testimony for a more detailed description of the pressure testing cost estimating methodology and assumptions.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Storage Pressure Testing	837
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The table below shows a summary of the pressure test projects and costs for SoCalGas Storage.

Storage Field	Phase	Miles			Pressure Test Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
Goleta	Phase 1A	0.913	-	0.913	100,000	500,000	600,000
Playa Del Rey	Phase 1A	1.918	-	1.918	100,000	500,000	600,000
Total	All	2.831	-	2.831	200,000	1,000,000	1,200,000

Cost estimates are shown in 2011$.

For Phase 1A (2012 - 2015), it was estimated that approximately 20% of the funding would be needed in the first year, 2012, and the remaining 80% would be distributed over the years 2013 - 2015 (approximately 26.7% in each year). The table below shows the total labor and non-labor costs in millions. No pressure test projects are planned for SoCalGas Storage in Phase 1B.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Phase 1A or 1B Costs	20%	27%	27%	27%	100%		
Labor	$ 0.0	$ 0.1	$ 0.1	$ 0.1	$ 0.2	$ -	$ 0.2
Non-Labor	$ 0.2	$ 0.3	$ 0.3	$ 0.3	$ 1.0	$ -	$ 1.0
Total	$ 0.2	$ 0.3	$ 0.3	$ 0.3	$ 1.2	$ -	$ 1.2

Costs in this table are shown in millions of 2011$.

Schedule

All SoCalGas Storage pressure test projects are scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 20% of the costs would occur in the first year (2012) and the remaining 80% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015).

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Summary of SDG&E Pressure Testing	863 & 887
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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	0.4	0.4
DIRECT NON-LABOR	0.0	0.1	0.1	0.1	0.2	9.8	10.0
TOTAL DIRECT O&M	0.1	0.1	0.1	0.1	0.3	10.2	10.5

Project Description

Both the Proposed Case Pipeline Safety Enhancement Plan and the Base Case include estimated costs for SDG&E to pressure test 30 miles of transmission pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SDG&E utilized the assistance of a third party engineering firm, System Planning Engineering and Consulting Services (SPEC Services), to develop the cost estimates for pressure testing. These estimates include the costs for pressure testing not only these 30 miles of pipe, but also the mileage of adjoining segments that similarly lack sufficient documentation of pressure testing, but are located in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. In addition, a small number of other segments were included, as necessary, to facilitate continuity of the testing. In total, 46 miles of SDG&E Transmission pipeline will be pressure tested in Phase 1 at a cost of $11 million.

Forecast Methodology

Pressure testing cost estimates were developed based on proposed pressure test mileage and certain pipeline system data, such as pipeline diameter, provided by SoCalGas and SDG&E to SPEC Services for each pipeline segment contained within the proposed scope of work. Estimating factors include segment size, pipeline profile, water supply, equipment, personnel, materials, etc. See Appendix D of Testimony for a more detailed description of the pressure testing cost estimating methodology and assumptions.

Please see the following workpapers for more details on the forecasting methodology for each area:
- SDG&E Transmission Pressure Testing
- SDG&E Distribution Pressure Testing

The costs shown in the table above include the costs for all pressure test projects scheduled for SDG&E Transmission and SDG&E Distribution.

OPERATIONS AND MAINTENANCE WORKPAPER

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Summary of SDG&E Pressure Testing	863 & 887
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The costs for each area are summarized below, shown in millions of 2011 dollars.

SDG&E Transmission Pressure Testing

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	-	-	-	-	-	0.4	0.4
DIRECT NON-LABOR	-	-	-	-	-	9.8	9.8
TOTAL DIRECT O&M	-	-	-	-	-	10.2	10.2

SDG&E Distribution Pressure Testing

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	-	0.0
DIRECT NON-LABOR	0.0	0.1	0.1	0.1	0.2	-	0.2
TOTAL DIRECT O&M	0.1	0.1	0.1	0.1	0.3	-	0.3

Schedule

SDG&E's Distribution pressure test project is scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 20% of the Phase 1 costs would occur in the first year (2012) and the remaining 80% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015). SDG&E's Transmission pressure test project is scheduled to be pressure tested in 2019 (Phase 1B).

Please see the following workpapers for more details on the project scheduling for each area:
- SDG&E Transmission Pressure Testing
- SDG&E Distribution Pressure Testing

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Transmission Pressure Testing	863
WITNESS	
Joseph Rivera	

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	-	-	-	-	-	0.4	0.4
DIRECT NON-LABOR	-	-	-	-	-	9.8	9.8
TOTAL DIRECT O&M	-	-	-	-	-	10.2	10.2

Project Description

Both the Proposed Case Pipeline Safety Enhancement Plan and the Base Case include estimated costs for SDG&E to pressure test 30 miles of transmission pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SDG&E utilized the assistance of a third party engineering firm, System Planning Engineering and Consulting Services (SPEC Services), to develop the cost estimates for pressure testing. These estimates include the costs for pressure testing not only these 30 miles of pipe, but also the mileage of adjoining segments that similarly lack sufficient documentation of pressure testing, but are located in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. In addition, a small number of other segments were included, as necessary, to facilitate continuity of the testing. In total, 46 miles of SDG&E Transmission pipeline will be pressure tested in Phase 1 at a cost of $11 million.

Forecast Methodology

Pressure testing cost estimates were developed based on proposed pressure test mileage and certain pipeline system data, such as pipeline diameter, provided by SoCalGas and SDG&E to SPEC Services for each pipeline segment contained within the proposed scope of work. Estimating factors include segment size, pipeline profile, water supply, equipment, personnel, materials, etc. See Appendix D of Testimony for a more detailed description of the pressure testing cost estimating methodology and assumptions.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Transmission Pressure Testing	863
WITNESS	
Joseph Rivera	

The table below shows the pressure test project for SDG&E Transmission.

Pipeline	Phase	Miles			Pressure Test Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
1600	Phase 1B	29.732	14.968	44.700	357,300	9,073,500	9,430,800

Cost estimates are shown in 2011$.

Based on historical projects, it was estimated that an average of one repair would be needed for each pressure test segment, and the repairs would cost an average of $50,000 (10% labor and 90% non-labor) each. The table below shows the estimated cost for pipe repairs.

Pipeline	Phase	Estimated Pressure Test Segments	Estimated Repairs (1 Repair per Pressure Test Segment)	Pressure Test Repair Cost Estimate		
				Labor (10% of Total)	Non Labor (90% of Total)	Total ($50,000 / Repair)
1600	Phase 1B	16	16	80,000	720,000	800,000

Cost estimates are shown in 2011$.

The pressure test for Line 1600 is scheduled for the year 2019 (Phase 1B). The table below shows the total labor and non-labor costs in millions. No pressure test projects are planned for SDG&E Transmission in Phase 1A .

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Phase 1A or 1B Costs	0%	0%	0%	0%	0%	100%	
Labor	$ -	$ -	$ -	$ -	$ -	$ 0.4	$ 0.4
Non-Labor	$ -	$ -	$ -	$ -	$ -	$ 9.8	$ 9.8
Total	$ -	$ -	$ -	$ -	$ -	$ 10.2	$ 10.2

Costs in this table are shown in millions of 2011$.

Schedule

The pressure test for Line 1600 is scheduled to be completed in 2019 during Phase 1B.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Distribution Pressure Testing	887
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	-	0.0
DIRECT NON-LABOR	0.0	0.1	0.1	0.1	0.2	-	0.2
TOTAL DIRECT O&M	0.1	0.1	0.1	0.1	0.3	-	0.3

Project Description

Both the Proposed Case Pipeline Safety Enhancement Plan and the Base Case include estimated costs for SDG&E to pressure test 30 miles of transmission pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SDG&E utilized the assistance of a third party engineering firm, System Planning Engineering and Consulting Services (SPEC Services), to develop the cost estimates for pressure testing. These estimates include the costs for pressure testing not only these 30 miles of pipe, but also the mileage of adjoining segments that similarly lack sufficient documentation of pressure testing, but are located in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. In addition, a small number of other segments were included, as necessary, to facilitate continuity of the testing. In total, 46 miles of SDG&E Transmission pipeline will be pressure tested in Phase 1 at a cost of $11 million.

Forecast Methodology

Pressure testing cost estimates were developed based on proposed pressure test mileage and certain pipeline system data, such as pipeline diameter, provided by SoCalGas and SDG&E to SPEC Services for each pipeline segment contained within the proposed scope of work. Estimating factors include segment size, pipeline profile, water supply, equipment, personnel, materials, etc. See Appendix D of Testimony for a more detailed description of the pressure testing cost estimating methodology and assumptions.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Distribution Pressure Testing	887
WITNESS	
Joseph Rivera	

The table below shows the pressure test projects for SDG&E Distribution. The details and cost estimates for this pipeline can be found in Appendix IX-1-D.

Pipeline	Phase	Miles			Pressure Test Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
49-15	Phase 1A	-	0.306	0.306	7,700	202,300	210,000

Cost estimates are shown in 2011$.

Based on historical projects, it was estimated that an average of one repair would be needed for each pressure test segment, and the repairs would cost an average of $50,000 (10% labor and 90% non-labor) each. The table below shows the estimated cost for pipe repairs.

Pipeline	Phase	Estimated Pressure Test Segments	Estimated Repairs (1 Repair per Pressure Test Segment)	Pressure Test Repair Cost Estimate		
				Labor (10% of Total)	Non Labor (90% of Total)	Total ($50,000 / Repair)
49-15	Phase 1A	1	1	5,000	45,000	50,000

Cost estimates are shown in 2011$.

It was estimated that approximately 20% of the funding for Line 49-15 would be needed in the first year of Phase 1A, 2012, and the remaining 80% would be distributed over the years 2013 - 2015 (approximately 26.7% in each year). The table below shows the total labor and non-labor costs in millions. No pressure test projects are planned for SDG&E Distribution in Phase 1B.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Phase 1A or 1B Costs	20%	27%	27%	27%	100%		
Labor	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ -	$ 0.0
Non-Labor	$ 0.0	$ 0.1	$ 0.1	$ 0.1	$ 0.2	$ -	$ 0.2
Total	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.3	$ -	$ 0.3

Costs in this table are shown in millions of 2011$.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Distribution Pressure Testing	887
WITNESS	
Joseph Rivera	

Schedule

The pressure test for Line 49-15 is scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 20% of the costs would occur in the first year (2012) and the remaining 80% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015).

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Summary of SoCalGas Pipeline Replacements	367 & 376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	6.8	10.6	10.6	10.6	38.5	-	38.5
DIRECT NON-LABOR	82.9	232.1	232.1	232.1	779.2	-	779.2
TOTAL DIRECT CAPITAL	89.7	242.7	242.7	242.7	817.6	-	817.6

Project Description

Both the Base Case and the Proposed Case Pipeline Safety Enhancement Plan require SoCalGas to replace approximately 128 miles of pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SoCalGas utilized the assistance of SPEC Services to develop the cost estimates for pipeline replacements. These estimates assume replacement of not only these 128 miles of pipeline, but also the mileage of adjoining segments, similarly lacking sufficient documentation of pressure test records, in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. A small number of other segments were included, as necessary, to facilitate continuity in construction. In total, 246 miles of SoCalGas transmission pipeline will be replaced in Phase 1 at a cost of $818 million.

Forecast Methodology

Replacement cost estimates were developed based on proposed replacement mileage and certain pipeline system data, such as operating pressure and diameter, provided by SoCalGas to SPEC Services for each pipeline contained within the proposed scope of work. GIS Maps of each pipeline were studied to identify the location and type of construction applicable for each relocation area. See Appendix E of testimony for pipeline replacement estimate assumptions.

Please see the following workpapers for more details on the forecasting methodology for each area:
- SoCalGas Transmission Pipeline Replacements
- SoCalGas Distribution Pipeline Replacements

The costs shown in the table above include all pipeline replacement projects scheduled for SoCalGas Transmission and SoCalGas Distribution.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Summary of SoCalGas Pipeline Replacements	367 & 376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

The costs for each area are summarized below, shown in millions of 2011 dollars.

SoCalGas Transmission Pipeline Replacements - Construction

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.6	2.1	2.1	2.1	7.8	-	7.8
DIRECT NON-LABOR	13.7	36.7	36.7	36.7	123.9	-	123.9
TOTAL DIRECT CAPITAL	15.3	38.8	38.8	38.8	131.7	-	131.7

SoCalGas Distribution Pipeline Replacements - Construction

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	5.2	8.5	8.5	8.5	30.6	-	30.6
DIRECT NON-LABOR	69.2	195.4	195.4	195.4	655.3	-	655.3
TOTAL DIRECT CAPITAL	74.4	203.9	203.9	203.9	685.9	-	685.9

Schedule

All of SoCalGas' pipeline replacement projects are scheduled to be completed during Phase 1A (2012 - 2015). Please see the following workpapers for more details on the project scheduling for each area:

- SoCalGas Transmission Pipeline Replacements
- SoCalGas Distribution Pipeline Replacements

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pipeline Replacements	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.6	2.1	2.1	2.1	7.8	-	7.8
DIRECT NON-LABOR	13.7	36.7	36.7	36.7	123.9	-	123.9
TOTAL DIRECT CAPITAL	15.3	38.8	38.8	38.8	131.7	-	131.7

Project Description

Both the Base Case and the Proposed Case Pipeline Safety Enhancement Plan require SoCalGas to replace approximately 128 miles of pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SoCalGas utilized the assistance of SPEC Services to develop the cost estimates for pipeline replacements. These estimates assume replacement of not only these 128 miles of pipeline, but also the mileage of adjoining segments, similarly lacking sufficient documentation of pressure test records, in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. A small number of other segments were included, as necessary, to facilitate continuity in construction. In total, 246 miles of SoCalGas transmission pipeline will be replaced in Phase 1 at a cost of $818 million.

Forecast Methodology

Replacement cost estimates were developed based on proposed replacement mileage and certain pipeline system data, such as operating pressure and diameter, provided by SoCalGas to SPEC Services for each pipeline contained within the proposed scope of work. GIS Maps of each pipeline were studied to identify the location and type of construction applicable for each relocation area. See Appendix E of testimony for pipeline replacement estimate assumptions.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pipeline Replacements	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

The table below shows a summary of the pipeline replacement projects for SoCalGas Transmission. The details and cost estimates for each of these pipelines can be found in Appendix IX-1-A.

Pipeline	Phase	Miles			Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
169	Phase 1A	0.012	-	0.012	12,600	190,500	203,100
247	Phase 1A	0.082	-	0.082	28,800	427,300	456,100
408XO1	Phase 1A	0.011	-	0.011	14,100	211,400	225,500
775	Phase 1A	0.090	-	0.090	24,100	358,800	382,900
775BO1	Phase 1A	0.007	-	0.007	10,900	165,000	175,900
1003	Phase 1A	1.291	0.117	1.408	105,100	2,818,500	2,923,600
1011	Phase 1A	1.832	3.303	5.135	288,800	15,437,700	15,726,500
1014	Phase 1A	0.003	-	0.003	17,000	254,600	271,600
1015	Phase 1A	7.821	0.024	7.845	794,500	42,456,800	43,251,300
1017BP1	Phase 1A	0.005	-	0.005	10,600	160,900	171,500
1017BP2	Phase 1A	0.005	-	0.005	10,600	160,900	171,500
1017BP3	Phase 1A	0.005	-	0.005	10,600	160,900	171,500
1017BR4	Phase 1A	0.004	-	0.004	10,800	164,400	175,200
1017BR5	Phase 1A	0.004	-	0.004	10,700	162,400	173,100
1017BR6	Phase 1A	0.004	-	0.004	10,700	162,400	173,100
1017BR7	Phase 1A	0.005	-	0.005	10,800	164,400	175,200
1019BP1	Phase 1A	0.004	-	0.004	9,900	150,600	160,500
1025	Phase 1A	0.072	-	0.072	30,300	448,900	479,200
1170 ID502-T 1	Phase 1A	0.001	-	0.001	8,800	134,900	143,700
1171 ID567-P 13	Phase 1A	0.003	-	0.003	11,800	178,000	189,800
1171LT1BP2	Phase 1A	0.017	-	0.017	19,400	289,700	309,100
1171LT2	Phase 1A	0.012	-	0.012	17,200	257,500	274,700
1172 ID 2313 1	Phase 1A	0.001	-	0.001	8,900	136,400	145,300
1172 ID 2313 2	Phase 1A	0.015	-	0.015	14,500	217,200	231,700
1172 ID 2313 3	Phase 1A	0.009	-	0.009	11,800	178,800	190,600
1172BP2ST2	Phase 1A	0.001	-	0.001	8,600	132,000	140,600
2000-0.18-BO	Phase 1A	0.012	-	0.012	11,200	169,700	180,900
2000-0.18-XO1	Phase 1A	0.009	-	0.009	10,700	162,900	173,600
2000-0.18-XO2	Phase 1A	0.009	-	0.009	14,200	213,600	227,800
3000-261.73-BO	Phase 1A	0.002	-	0.002	9,100	138,600	147,700
3000-261.73-BR	Phase 1A	0.005	-	0.005	9,800	149,200	159,000

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pipeline Replacements	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

Pipeline	Phase	Miles			Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
5009	Phase 1A	0.041	-	0.041	23,900	359,600	383,500
L-6914 Extension	Phase 1A	-	15.000	15.000	978,000	52,202,600	53,180,600
Phase 1A Pipeline Total	Phase 1A	11.393	18.445	29.837	2,568,800	118,977,100	121,545,900
Supplemental Costs[1]	Phase 1A	-	-	-	5,280,100	4,873,093	10,153,194
Total	All	11.393	18.445	29.837	7,848,900	123,850,193	131,699,094

Cost estimates are shown in 2011$.

1.These supplemental labor and non labor costs are for the support services within the company that will be necessary to implement the PSEP. Included are customer and public outreach, fleets, building and real estate, training, environment and safety, permitting, right-of –way, legal, human resources, Information technology, Accounting and Finance, etc… This is part of the larger Pipeline Safety Enhancement Program, and these costs were allocated between SoCalGas Transmission, SoCalGas Distribution, SDG&E Transmission and SDG&E Distribution based on pipeline mileage.

It is estimated that approximately 12% of the funding will be needed in the first year (2012), and the remaining 88% will be spread across the remaining Phase 1A years (29.5% per year in 2013, 2014, and 2015). The table below shows the labor and non-labor totals in each year, in millions of 2011 dollars.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Total Costs	12%	29%	29%	29%	100%	0%	
Labor	$ 1.6	$ 2.1	$ 2.1	$ 2.1	$ 7.8	$ -	$ 7.8
Non-Labor	$ 13.7	$ 36.7	$ 36.7	$ 36.7	$ 123.9	$ -	$ 123.9
Total	$ 15.3	$ 38.8	$ 38.8	$ 38.8	$ 131.7	$ -	$ 131.7

Costs in this table are shown in millions of 2011$.

Schedule

All of SoCalGas' Transmission pipeline replacement projects are scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 12% of the Phase 1 costs would occur in the first year (2012) and the remaining 88% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015).

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pipeline Replacements	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	5.2	8.5	8.5	8.5	30.6	-	30.6
DIRECT NON-LABOR	69.2	195.4	195.4	195.4	655.3	-	655.3
TOTAL DIRECT CAPITAL	74.4	203.9	203.9	203.9	685.9	-	685.9

Project Description

Both the Base Case and the Proposed Case Pipeline Safety Enhancement Plan require SoCalGas to replace approximately 128 miles of pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SoCalGas utilized the assistance of SPEC Services to develop the cost estimates for pipeline replacements. These estimates assume replacement of not only these 128 miles of pipeline, but also the mileage of adjoining segments, similarly lacking sufficient documentation of pressure test records, in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. A small number of other segments were included, as necessary, to facilitate continuity in construction. In total, 246 miles of SoCalGas transmission pipeline will be replaced in Phase 1 at a cost of $818 million.

Forecast Methodology

Replacement cost estimates were developed based on proposed replacement mileage and certain pipeline system data, such as operating pressure and diameter, provided by SoCalGas to SPEC Services for each pipeline contained within the proposed scope of work. GIS Maps of each pipeline were studied to identify the location and type of construction applicable for each relocation area. See Appendix E of testimony for pipeline replacement estimate assumptions.

The table below shows a summary of the pipeline replacement projects for SoCalGas Distribution. The details and cost estimates for each of these pipelines can be found in Appendix IX-1-B.

Pipeline	Phase	Miles			Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
30-02	Phase 1A	1.561	1.271	2.832	385,733	10,353,971	10,739,704
30-18	Phase 1A	2.139	0.445	2.584	313,100	16,738,500	17,051,600
30-32	Phase 1A	1.042	2.349	3.392	281,100	7,548,700	7,829,800
30-6200	Phase 1A	0.020	0.001	0.021	14,800	221,800	236,600
30-6292	Phase 1A	0.010	-	0.010	11,200	169,700	180,900

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pipeline Replacements	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

Pipeline	Phase	Miles			Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
31-09	Phase 1A	7.348	5.462	12.810	620,200	33,145,300	33,765,500
32-21	Phase 1A	8.590	1.641	10.230	706,600	37,716,400	38,423,000
33-120	Phase 1A	0.387	0.865	1.252	270,200	7,258,900	7,529,100
33-121	Phase 1A	0.164	-	0.164	89,500	1,317,000	1,406,500
35-10	Phase 1A	2.359	1.080	3.440	452,500	12,161,300	12,613,800
35-20	Phase 1A	0.556	-	0.556	105,300	2,824,700	2,930,000
35-20-A	Phase 1A	1.324	-	1.324	192,200	5,168,000	5,360,200
35-20-A1	Phase 1A	0.285	0.011	0.296	87,800	1,299,900	1,387,700
35-20-N	Phase 1A	0.010	-	0.010	10,900	164,500	175,400
35-22	Phase 1A	0.336	0.011	0.346	72,400	1,071,600	1,144,000
35-40	Phase 1A	0.145	0.088	0.233	47,500	705,000	752,500
35-6405	Phase 1A	0.113	0.017	0.130	38,900	579,000	617,900
35-6405BR1	Phase 1A	0.005	-	0.005	9,500	145,400	154,900
35-6416	Phase 1A	0.059	0.074	0.133	42,100	624,800	666,900
35-6520	Phase 1A	0.001	0.025	0.026	14,400	216,100	230,500
36-8-01	Phase 1A	5.444	0.159	5.603	409,500	21,938,100	22,347,600
36-8-01-C	Phase 1A	0.164	-	0.164	46,800	693,600	740,400
36-8-06	Phase 1A	-	0.042	0.042	14,300	214,400	228,700
36-9-06	Phase 1A	3.841	4.076	7.916	427,200	22,800,600	23,227,800
36-9-06-A	Phase 1A	2.641	-	2.641	303,200	8,136,400	8,439,600
36-9-09 North	Phase 1A	9.662	6.354	16.016	849,500	45,502,300	46,351,800
36-9-21	Phase 1A	0.389	-	0.389	80,000	1,184,600	1,264,600
36-37	Phase 1A	0.022	-	0.022	29,400	434,700	464,100
36-1002	Phase 1A	0.071	0.138	0.209	45,900	681,500	727,400
36-1006	Phase 1A	0.200	0.526	0.726	69,300	2,027,900	2,097,200
36-1032	Phase 1A	0.697	0.843	1.540	220,300	5,922,200	6,142,500
37-04	Phase 1A	4.522	4.505	9.027	694,400	37,177,500	37,871,900
37-07	Phase 1A	2.673	0.010	2.683	441,000	11,837,900	12,278,900
37-18	Phase 1A	3.561	0.603	4.165	306,100	16,369,900	16,676,000
37-18-F	Phase 1A	2.057	-	2.057	295,900	7,952,800	8,248,700
37-18-J	Phase 1A	0.012	-	0.012	14,200	213,600	227,800
37-18-K	Phase 1A	2.850	-	2.850	474,300	12,729,600	13,203,900
37-49	Phase 1A	0.814	0.272	1.086	208,800	5,601,600	5,810,400
37-6180	Phase 1A	0.020	-	0.020	10,600	161,000	171,600
38-200	Phase 1A	0.233	-	0.233	49,300	736,600	785,900
38-501	Phase 1A	1.147	0.838	1.985	193,000	5,188,400	5,381,400

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pipeline Replacements	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

Pipeline	Phase	Miles			Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
38-508	Phase 1A	0.501	-	0.501	62,900	1,841,900	1,904,800
38-512	Phase 1A	2.238	2.546	4.784	340,600	9,161,300	9,501,900
38-514	Phase 1A	0.174	4.098	4.273	402,300	10,817,600	11,219,900
38-516	Phase 1A	7.344	3.642	10.986	562,700	30,155,400	30,718,100
38-523	Phase 1A	0.250	2.663	2.913	216,900	5,846,100	6,063,000
38-539	Phase 1A	2.361	9.722	12.083	566,800	30,380,200	30,947,000
38-552	Phase 1A	3.226	4.762	7.988	327,600	17,589,900	17,917,500
38-959	Phase 1A	4.327	11.276	15.603	521,700	27,851,000	28,372,700
41-04-I	Phase 1A	0.346	0.031	0.378	78,200	1,157,500	1,235,700
41-05	Phase 1A	2.760	0.017	2.777	389,000	10,460,600	10,849,600
41-05-A	Phase 1A	0.406	-	0.406	79,400	1,175,500	1,254,900
41-17	Phase 1A	1.686	1.889	3.575	287,100	7,722,700	8,009,800
41-17-A2	Phase 1A	0.003	-	0.003	8,800	135,000	143,800
41-17-F	Phase 1A	0.033	-	0.033	12,600	189,600	202,200
41-19	Phase 1A	0.011	-	0.011	18,200	271,700	289,900
41-25-A	Phase 1A	4.783	0.038	4.821	345,200	18,479,600	18,824,800
41-30	Phase 1A	3.891	0.058	3.949	342,500	18,306,500	18,649,000
41-30-A	Phase 1A	0.259	-	0.259	67,500	1,001,300	1,068,800
41-55	Phase 1A	0.007	-	0.007	9,500	144,600	154,100
41-80	Phase 1A	0.014	1.822	1.836	139,500	3,763,500	3,903,000
41-84	Phase 1A	0.827	0.176	1.003	137,100	3,680,300	3,817,400
41-84-A	Phase 1A	0.225	0.001	0.227	48,000	712,200	760,200
41-101	Phase 1A	0.010	-	0.010	9,700	147,900	157,600
41-116	Phase 1A	0.003	0.003	0.006	10,800	163,200	174,000
41-116BP1	Phase 1A	0.002	-	0.002	9,400	142,600	152,000
41-117	Phase 1A	0.001	0.003	0.004	8,900	135,700	144,600
41-141	Phase 1A	0.006	-	0.006	8,800	134,600	143,400
41-181	Phase 1A	0.002	-	0.002	9,300	141,200	150,500
41-199	Phase 1A	0.007	0.001	0.008	9,500	144,700	154,200
41-6001-2	Phase 1A	0.005	-	0.005	9,700	147,400	157,100
41-6045	Phase 1A	0.009	-	0.009	9,600	146,300	155,900
42-46	Phase 1A	0.691	0.781	1.471	224,800	6,031,600	6,256,400
42-46-F	Phase 1A	0.154	1.649	1.803	102,100	2,747,500	2,849,600
42-66-1	Phase 1A	0.036	-	0.036	18,100	269,800	287,900
42-66-2	Phase 1A	0.026	0.002	0.028	14,500	218,500	233,000
43-34	Phase 1A	1.577	1.711	3.288	447,800	12,020,000	12,467,800

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pipeline Replacements	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

Pipeline	Phase	Miles			Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
43-121	Phase 1A	2.766	1.645	4.411	336,500	17,992,100	18,328,600
43-1106	Phase 1A	0.145	-	0.145	53,000	782,300	835,300
44-137	Phase 1A	0.996	0.007	1.004	155,900	4,184,800	4,340,700
44-654	Phase 1A	0.010	-	0.010	10,100	153,900	164,000
44-687	Phase 1A	0.055	0.170	0.225	48,000	711,900	759,900
44-720	Phase 1A	0.952	0.216	1.168	91,100	2,450,100	2,541,200
45-120	Phase 1A	1.772	2.529	4.301	328,900	17,554,900	17,883,800
45-120X01	Phase 1A	0.002	0.006	0.008	11,600	175,600	187,200
45-163	Phase 1A	0.787	0.122	0.909	129,700	3,475,900	3,605,600
6914 Extension	Phase 1A	-	13.100	13.100	453,100	24,361,700	24,814,800
Phase 1A Pipeline Total	Phase 1A	113.160	96.392	209.552	16,423,933	642,213,971	658,637,904
Supplemental Costs[1]	Phase 1A	-	-	-	14,193,007	13,098,964	27,291,971
Total	All	113.160	96.392	209.552	30,616,939	655,312,935	685,929,874

Cost estimates are shown in 2011$.

1.These supplemental labor and non labor costs are for the support services within the company that will be necessary to implement the PSEP. Included are customer and public outreach, fleets, building and real estate, training, environment and safety, permitting, right-of –way, legal, human resources, Information technology, Accounting and Finance, etc… This is part of the larger Pipeline Safety Enhancement Program, and these costs were allocated between SoCalGas Transmission, SoCalGas Distribution, SDG&E Transmission and SDG&E Distribution based on pipeline mileage.

It is estimated that approximately 11% of the funding will be needed in the first year (2012), and the remaining 89% will be spread across the remaining Phase 1A years (29.7% per year in 2013, 2014, and 2015). The table below shows the labor and non-labor totals in each year, in millions of 2011 dollars.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Total Costs	11%	30%	30%	30%	100%	0%	
Labor	$ 5.2	$ 8.5	$ 8.5	$ 8.5	$ 30.6	$ -	$ 30.6
Non-Labor	$ 69.2	$ 195.4	$ 195.4	$ 195.4	$ 655.3	$ -	$ 655.3
Total	$ 74.4	$ 203.9	$ 203.9	$ 203.9	$ 685.9	$ -	$ 685.9

Costs in this table are shown in millions of 2011$.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pipeline Replacements	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

Schedule

All SoCalGas Distribution pipeline replacement projects are scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 11% of the costs would occur in the first year (2012) and the remaining 89% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015).

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Summary of SDG&E Pipeline Replacements	367 & 376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2018

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.6	2.4	2.4	2.4	8.9	7.6	16.4
DIRECT NON-LABOR	21.4	55.4	55.4	55.4	187.7	310.6	498.3
TOTAL DIRECT CAPITAL	22.9	57.9	57.9	57.9	196.5	318.2	514.7

Project Description

Both the Base Case and the Proposed Case Pipeline Safety Enhancement Plan require SDG&E to replace approximately 28 miles of pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SDG&E utilized the assistance of SPEC Services to develop the cost estimates for pipeline replacements. These estimates assume replacement of not only these 28 miles of pipeline, but also the mileage of adjoining segments, similarly lacking sufficient documentation of pressure test records, in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. A small number of other segments were included, as necessary, to facilitate continuity in construction. In total, 102 miles of SDG&E transmission pipeline will be replace in Phase 1 at a cost of $515 million.

Forecast Methodology

Replacement cost estimates were developed based on proposed replacement mileage and certain pipeline system data, such as operating pressure and diameter, provided by SoCalGas to SPEC Services for each pipeline contained within the proposed scope of work. GIS Maps of each pipeline were studied to identify the location and type of construction applicable for each relocation area. See Appendix E of testimony for pipeline replacement estimate assumptions.

Please see the following workpapers for more details on the forecasting methodology for each area:
- SDG&E Transmission Pipeline Replacements
- SDG&E Distribution Pipeline Replacements

The costs shown in the table above include all pipeline replacement projects scheduled for SDG&E Transmission and SDG&E Distribution.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Summary of SDG&E Pipeline Replacements	367 & 376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2018

The costs for each area are summarized below, shown in millions of 2011 dollars.

SDG&E Transmission Pipeline Replacements - Construction

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.6	0.6	0.6	0.6	2.6	7.6	10.1
DIRECT NON-LABOR	3.2	2.8	2.8	2.8	11.8	310.6	322.4
TOTAL DIRECT CAPITAL	3.9	3.5	3.5	3.5	14.3	318.2	332.5

SDG&E Distribution Pipeline Replacements - Construction

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.0	1.8	1.8	1.8	6.3	-	6.3
DIRECT NON-LABOR	18.1	52.6	52.6	52.6	175.9	-	175.9
TOTAL DIRECT CAPITAL	19.1	54.4	54.4	54.4	182.2	-	182.2

Schedule

The majority of the pipeline replacement projects are scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 10% of the Phase 1 costs for these projects would occur in the first year (2012) and the remaining 90% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015). The exceptions is Line 1600, which carries into the first three years of Phase 1B (2016 - 2018).

Please see the following workpapers for more details on the project scheduling for each area:
- SDG&E Transmission Pipeline Replacements
- SDG&E Distribution Pipeline Replacements

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Transmission Pipeline Replacements	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2018

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	0.6	0.6	0.6	0.6	2.6	7.6	10.1
DIRECT NON-LABOR	3.2	2.8	2.8	2.8	11.8	310.6	322.4
TOTAL DIRECT CAPITAL	3.9	3.5	3.5	3.5	14.3	318.2	332.5

Project Description

Both the Base Case and the Proposed Case Pipeline Safety Enhancement Plan require SDG&E to replace approximately 28 miles of pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SDG&E utilized the assistance of SPEC Services to develop the cost estimates for pipeline replacements. These estimates assume replacement of not only these 28 miles of pipeline, but also the mileage of adjoining segments, similarly lacking sufficient documentation of pressure test records, in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. A small number of other segments were included, as necessary, to facilitate continuity in construction. In total, 102 miles of SDG&E transmission pipeline will be replace in Phase 1 at a cost of $515 million.

Forecast Methodology

Replacement cost estimates were developed based on proposed replacement mileage and certain pipeline system data, such as operating pressure and diameter, provided by SoCalGas to SPEC Services for each pipeline contained within the proposed scope of work. GIS Maps of each pipeline were studied to identify the location and type of construction applicable for each relocation area. See Appendix E of testimony for pipeline replacement estimate assumptions.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Transmission Pipeline Replacements	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2018

The table below shows the pipeline replacement project for SDG&E Transmission. The details and cost estimates for this project can be found in Appendix IX-1-C.

Pipeline	Phase	Miles			Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
1600	Phase 1A & 1B	-	53.600	53.600	5,988,400	318,832,700	324,821,100
Supplemental Costs[1]	Phase 1A & 1B	-	-	-	4,152,927	3,554,709	7,707,636
Total	All	-	53.600	53.600	10,141,327	322,387,409	332,528,736

Cost estimates are shown in 2011$.

1.These supplemental labor and non labor costs are for the support services within the company that will be necessary to implement the PSEP. Included are customer and public outreach, fleets, building and real estate, training, environment and safety, permitting, right-of –way, legal, human resources, Information technology, Accounting and Finance, etc… This is part of the larger Pipeline Safety Enhancement Program, and these costs were allocated between SoCalGas Transmission, SoCalGas Distribution, SDG&E Transmission and SDG&E Distribution based on pipeline mileage.

It is estimated that approximately 4% of the funding will be needed during Phase 1A (2012 - 2015), and the remaining 96% will be spread across the first three years of Phase 1B years (2016 - 2018). The table below shows the labor and non-labor totals in each year, in millions of 2011 dollars.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Total Costs	1%	1%	1%	1%	4%	96%	
Labor	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 2.6	$ 7.6	$ 10.1
Non-Labor	$ 3.2	$ 2.8	$ 2.8	$ 2.8	$ 11.8	$ 310.6	$ 322.4
Total	$ 3.9	$ 3.5	$ 3.5	$ 3.5	$ 14.3	$ 318.2	$ 332.5

Costs in this table are shown in millions of 2011$.

Schedule

The pipeline replacement project for Line 1600 is expected to span both Phase 1A and Phase 1B. It is estimated that approximately 4% of the total costs will occur in Phase 1A (2012 - 2015) and the remaining 96% of the costs will occur in the first three years of Phase 1B (2016 - 2018).

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Distribution Pipeline Replacements	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.0	1.8	1.8	1.8	6.3	-	6.3
DIRECT NON-LABOR	18.1	52.6	52.6	52.6	175.9	-	175.9
TOTAL DIRECT CAPITAL	19.1	54.4	54.4	54.4	182.2	-	182.2

Project Description

Both the Base Case and the Proposed Case Pipeline Safety Enhancement Plan require SDG&E to replace approximately 28 miles of pipeline segments located in Class 3 and 4 locations or High Consequence Areas. SDG&E utilized the assistance of SPEC Services to develop the cost estimates for pipeline replacements. These estimates assume replacement of not only these 28 miles of pipeline, but also the mileage of adjoining segments, similarly lacking sufficient documentation of pressure test records, in Class 1 and 2 non-High Consequence Areas. These adjoining miles, which would otherwise be addressed in Phase 2, were included within the scope of Phase 1 to maximize the cost effectiveness and minimize the impacts to customers of execution of the proposed Pipeline Safety Enhancement Plan. A small number of other segments were included, as necessary, to facilitate continuity in construction. In total, 102 miles of SDG&E transmission pipeline will be replace in Phase 1 at a cost of $515 million.

Forecast Methodology

Replacement cost estimates were developed based on proposed replacement mileage and certain pipeline system data, such as operating pressure and diameter, provided by SoCalGas to SPEC Services for each pipeline contained within the proposed scope of work. GIS Maps of each pipeline were studied to identify the location and type of construction applicable for each relocation area. See Appendix E of testimony for pipeline replacement estimate assumptions.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Distribution Pipeline Replacements	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

The table below shows a summary of the pipeline replacement projects for SDG&E Distribution. The details and cost estimates for each of these pipelines can be found in Appendix IX-1-D.

Pipeline	Phase	Miles			Cost Estimate		
		Cat 4 Criteria Miles	Accelerated Miles	Total Miles	Labor	Non Labor	Total
49-11	Phase 1A	0.344	-	0.344	57,900	1,684,900	1,742,800
49-13	Phase 1A	3.464	-	3.464	443,300	11,931,300	12,374,600
49-14	Phase 1A	0.316	2.134	2.450	256,100	6,875,100	7,131,200
49-15	Phase 1A	1.978	4.626	6.604	372,900	19,966,400	20,339,300
49-16	Phase 1A	0.722	8.868	9.590	677,500	36,235,000	36,912,500
49-17	Phase 1A	5.259	0.553	5.812	367,500	19,645,500	20,013,000
49-18	Phase 1A	7.197	0.115	7.312	609,000	32,525,700	33,134,700
49-19	Phase 1A	1.306	0.357	1.663	194,023	5,208,862	5,402,885
49-20	Phase 1A	0.038	-	0.038	-	-	-
49-22	Phase 1A	-	-	-	-	-	-
49-25	Phase 1A	1.566	0.712	2.278	301,600	8,098,900	8,400,500
49-26	Phase 1A	2.396	0.219	2.615	344,200	9,247,000	9,591,200
49-27	Phase 1A	1.439	0.002	1.442	168,200	4,515,600	4,683,800
49-28	Phase 1A	1.796	3.099	4.895	328,000	17,535,100	17,863,100
49-32	Phase 1A	0.057	-	0.057	30,300	448,400	478,700
Phase 1A Pipeline Total	Phase 1A	27.878	20.685	48.564	4,150,523	173,917,762	178,068,285
Supplemental Costs[1]	Phase 1A	-	-	-	2,153,790	1,987,769	4,141,559
Total	All	27.878	20.685	48.564	6,304,313	175,905,531	182,209,844

Cost estimates are shown in 2011$.

1.These supplemental labor and non labor costs are for the support services within the company that will be necessary to implement the PSEP. Included are customer and public outreach, fleets, building and real estate, training, environment and safety, permitting, right-of –way, legal, human resources, Information technology, Accounting and Finance, etc… This is part of the larger Pipeline Safety Enhancement Program, and these costs were allocated between SoCalGas Transmission, SoCalGas Distribution, SDG&E Transmission and SDG&E Distribution based on pipeline mileage.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Distribution Pipeline Replacements	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2015

It is estimated that approximately 10% of the funding will be needed in the first year (2012), and the remaining 90% will be spread across the remaining Phase 1A years (2013 - 2015). The table below shows the labor and non-labor totals in each year, in millions of 2011 dollars.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Total Costs	10%	30%	30%	30%	100%	0%	
Labor	$ 1.0	$ 1.8	$ 1.8	$ 1.8	$ 6.3	$ -	$ 6.3
Non-Labor	$ 18.1	$ 52.6	$ 52.6	$ 52.6	$ 175.9	$ -	$ 175.9
Total	$ 19.1	$ 54.4	$ 54.4	$ 54.4	$ 182.2	$ -	$ 182.2

Costs in this table are shown in millions of 2011$.

Schedule

All SDG&E Distribution pipeline replacement projects are scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 10% of the costs would occur in the first year (2012) and the remaining 90% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015).

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission In-Line-Inspection	856
WITNESS	
Joseph Rivera	

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.2	1.5	1.5	1.5	5.8	-	5.8
DIRECT NON-LABOR	10.4	13.9	13.9	13.9	52.1	-	52.1
TOTAL DIRECT O&M	11.6	15.4	15.4	15.4	57.9	-	57.9

Project Description

SoCalGas currently operates approximately 170 miles of transmission pipeline segments located in Class 3 and 4 locations or High Consequence Areas that lack sufficient documentation of pressure testing to satisfy the requirements of 49 CFR 192.619(a)(b) or (d) that are already configured to allow for in-line-inspection. These pipelines have already been inspected with a magnetic flux leakage (MFL) in-line inspection tool as part of our existing pipeline integrity management program, with re-assessments scheduled to occur over the next five years. During the re-assessment, in addition to running the MFL tool, a transverse flux in-line inspection (TFI) tool will also be utilized to allow for evaluation of the condition of the long seam as well. In order to assess these 170 miles of pipe in Class 3 and 4 locations or High Consequence Areas with existing launchers and receivers, a total of 667 miles will be inspected in 26 separate in-line inspection runs.

Forecast Methodology

The incremental cost to run a TFI tool through the pipeline is estimated at $200,000/run. In addition, costs for two validation digs per run (at $50,000/dig) and one excavation and repair ($75,000) per mile were added to the total cost. These values are based on historical costs observed on prior company projects.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission In-Line-Inspection	856
WITNESS	
Joseph Rivera	

The table below shows a summary of the in-line inspection (ILI) projects for SoCalGas Transmission. The details and cost estimates for each of these pipelines can be found in the following pages.

Pipeline	Phase	ILI Information			ILI Cost Estimate		
		Total ILI Miles	ILI Runs ($200,000 per Run)	Validation Digs ($50,000 per Dig)	Labor (10% of Total)	Non Labor (90% of Total)	Total
235 East	Phase 1A	64.41	1	2	30,000	270,000	300,000
235 West	Phase 1A	107.97	2	4	60,000	540,000	600,000
317	Phase 1A	2.00	1	2	30,000	270,000	300,000
404	Phase 1A	36.35	2	4	60,000	540,000	600,000
406	Phase 1A	51.46	1	2	30,000	270,000	300,000
407	Phase 1A	12.51	1	2	30,000	270,000	300,000
1004	Phase 1A	25.80	2	4	60,000	540,000	600,000
1005	Phase 1A	10.11	1	2	30,000	270,000	300,000
1013	Phase 1A	4.49	1	2	30,000	270,000	300,000
1020	Phase 1A	5.80	1	2	30,000	270,000	300,000
1024	Phase 1A	1.65	1	2	30,000	270,000	300,000
2000	Phase 1A	129.68	4	8	120,000	1,080,000	1,200,000
2001 East	Phase 1A	43.19	1	2	30,000	270,000	300,000
2001 West	Phase 1A	102.68	3	6	90,000	810,000	900,000
2003	Phase 1A	26.96	2	4	60,000	540,000	600,000
3000 East	Phase 1A	7.80	1	2	30,000	270,000	300,000
4000	Phase 1A	34.49	1	2	30,000	270,000	300,000
Total	All	667.35	26	52	780,000	7,020,000	7,800,000

Cost estimates are shown in 2011$.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission In-Line-Inspection	856
WITNESS	
Joseph Rivera	

Based on historical projects, it was estimated that an average of one repair would be needed for each mile of pipe inspected, and the repairs would cost an average of $75,000 (10% labor and 90% non-labor) each. The table below shows the estimated cost for pipe repairs.

Pipeline	Phase	Total ILI Miles	Estimated Repairs (1 Repair per ILI Mile)	ILI Repair Cost Estimate		
				Labor (10% of Total)	Non Labor (90% of Total)	Total ($75,000 / Repair)
235 East	Phase 1A	64.41	64	483,075	4,347,675	4,830,750
235 West	Phase 1A	107.97	108	809,775	7,287,975	8,097,750
317	Phase 1A	2.00	2	15,000	135,000	150,000
404	Phase 1A	36.35	36	272,625	2,453,625	2,726,250
406	Phase 1A	51.46	51	385,950	3,473,550	3,859,500
407	Phase 1A	12.51	13	93,825	844,425	938,250
1004	Phase 1A	25.80	26	193,500	1,741,500	1,935,000
1005	Phase 1A	10.11	10	75,825	682,425	758,250
1013	Phase 1A	4.49	4	33,675	303,075	336,750
1020	Phase 1A	5.80	6	43,500	391,500	435,000
1024	Phase 1A	1.65	2	12,375	111,375	123,750
2000	Phase 1A	129.68	130	972,600	8,753,400	9,726,000
2001 East	Phase 1A	43.19	43	323,925	2,915,325	3,239,250
2001 West	Phase 1A	102.68	103	770,100	6,930,900	7,701,000
2003	Phase 1A	26.96	27	202,200	1,819,800	2,022,000
3000 East	Phase 1A	7.80	8	58,500	526,500	585,000
4000	Phase 1A	34.49	34	258,675	2,328,075	2,586,750
Total	All	667.35	667	5,005,125	45,046,125	50,051,250

Cost estimates are shown in 2011$.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission In-Line-Inspection	856
WITNESS	
Joseph Rivera	

For Phase 1A (2012 - 2015), it was estimated that approximately 20% of the funding would be needed in the first year, 2012, and the remaining 80% would be distributed over the years 2013 - 2015 (approximately 26.7% in each year). The table below shows the total labor and non-labor costs in millions. No ILI projects are planned for SoCalGas Transmission in Phase 1B.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Phase 1A or 1B Costs	20%	27%	27%	27%	100%		
Labor	$ 1.2	$ 1.5	$ 1.5	$ 1.5	$ 5.8	$ -	$ 5.8
Non-Labor	$ 10.4	$ 13.9	$ 13.9	$ 13.9	$ 52.1	$ -	$ 52.1
Total	$ 11.6	$ 15.4	$ 15.4	$ 15.4	$ 57.9	$ -	$ 57.9

Costs in this table are shown in millions of 2011$.

Schedule

All SoCalGas Transmission ILI projects are scheduled to be completed during Phase 1A (2012 - 2015). It was estimated that approximately 20% of the costs would occur in the first year (2012) and the remaining 80% of the costs would be spread evenly over the remaining Phase 1A years (2013 - 2015).

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Transmission In-Line-Inspection	856
WITNESS	
Joseph Rivera	

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	-	-	0.4	-	0.4	-	0.4
DIRECT NON-LABOR	-	-	3.9	-	3.9	-	3.9
TOTAL DIRECT O&M	-	-	4.3	-	4.3	-	4.3

Project Description

SDG&E currently operates approximately 30 miles of transmission pipeline segments located in Class 3 and 4 locations or High Consequence Areas that lack sufficient documentation of pressure testing to satisfy the requirements of 49 CFR 192.619(a)(b) or (d) that are already configured to allow for in-line-inspection. These pipelines have already been inspected with a magnetic flux leakage (MFL) in-line inspection tool as part of our existing pipeline integrity management program, with re-assessments scheduled to occur over the next five years. During the re-assessment, in addition to running the MFL tool, a transverse flux in-line inspection (TFI) tool will also be utilized to allow for evaluation of the condition of the long seam as well. In order to assess these 30 miles of pipe in Class 3 and 4 locations or High Consequence Areas with existing launchers and receivers, a total of 54 miles will be inspected.

Forecast Methodology

The incremental cost to run a TFI tool through the pipeline is estimated at $200,000/run. In addition, costs for two validation digs per run (at $50,000/dig) and one excavation and repair ($75,000) per mile were added to the total cost. These values are based on historical costs observed on prior company projects.

OPERATIONS AND MAINTENANCE WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SDG&E Transmission In-Line-Inspection	856
WITNESS	
Joseph Rivera	

The table below shows a summary of the in-line inspection (ILI) projects for SDG&E Transmission. The details and cost estimates for each of these pipelines can be found in the following pages.

Pipeline	Phase	ILI Information			ILI Cost Estimate		
		Total ILI Miles	ILI Runs ($200,000 per Run)	Validation Digs ($50,000 per Dig)	Labor (10% of Total)	Non Labor (90% of Total)	Total
1600	Phase 1A	53.60	1	2	30,000	270,000	300,000

Cost estimates are shown in 2011$.

Based on historical projects, it was estimated that an average of one repair would be needed for each mile of pipe inspected, and the repairs would cost an average of $75,000 (10% labor and 90% non-labor) each. The table below shows the estimated cost for pipe repairs.

Pipeline	Phase	Total ILI Miles	Estimated Repairs (1 Repair per ILI Mile)	ILI Repair Cost Estimate		
				Labor (10% of Total)	Non Labor (90% of Total)	Total ($75,000 / Repair)
1600	Phase 1A	53.60	54	402,000	3,618,000	4,020,000

Cost estimates are shown in 2011$.

The in-line inspection for Line 1600 is scheduled for the year 2014 (Phase 1A). The table below shows the total labor and non-labor costs in millions.

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Phase 1A or 1B Costs	0%	0%	100%	0%	100%	0%	
Labor	$ -	$ -	$ 0.4	$ -	$ 0.4	$ -	$ 0.4
Non-Labor	$ -	$ -	$ 3.9	$ -	$ 3.9	$ -	$ 3.9
Total	$ -	$ -	$ 4.3	$ -	$ 4.3	$ -	$ 4.3

Costs in this table are shown in millions of 2011$.

Schedule

The in-line inspection for Line 1600 is scheduled to be completed in 2014 during Phase 1A.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Summary of SoCalGas Pipeline Replacements to Mitigate Construction/Fabrication Methods	367 & 376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.4	2.9	2.9	2.9	10.0	67.3	77.3
DIRECT NON-LABOR	27.1	54.2	54.2	54.2	189.8	816.7	1,006.5
TOTAL DIRECT CAPITAL	28.5	57.1	57.1	57.1	199.8	884.0	1,083.8

Project Description

As explained in Chapter IV of testimony, in an effort to further enhance public safety, non-piggable pipelines that were installed prior to 1946 using historic welding and construction practices that are no longer industry standard are targeted for replacement under the proposed Pipeline Safety Enhancement Plan. Specifically, we propose to address pipeline segments that contain oxy acetylene girth welds and/or wrinkle bends. All pipeline segments known to have these properties are operated by SoCalGas. Some transmission pipelines that meet this criteria also lack sufficient documentation of pressure testing to satisfy the requirements of 49 CFR 192.619(a)(b) or (d), and therefore, are scheduled to be replaced under both the Base Case and Proposed Case. All non-piggable pre-1946 pipeline segments that have not already been identified for replacement under the Base Case are scheduled for replacement as part of the Proposed Case Pipeline Safety Enhancement Plan. Replacement of wrinkle bends located on pipelines that are scheduled to be pressure tested will be coordinated with the pressure testing, so as to take advantage of the pipeline already being removed from service for testing. These coordinated activities may therefore occur in Phase 1A. Remaining wrinkle bends will be targeted for replacement in Phase 1B.

Forecast Methodology

The costs shown in the table above include all pipeline replacement projects scheduled for SoCalGas Transmission and SoCalGas Distribution.

Please see the following workpapers for details on the forecasting methodology for each area:
- SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Wrinkle Bends
- SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe
- SoCalGas Distribution Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Summary of SoCalGas Pipeline Replacements to Mitigate Construction/Fabrication Methods	367 & 376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

The costs for each area are summarized below, shown in millions of 2011 dollars.

SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Wrinkle Bends

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.4	2.9	2.9	2.9	10.0	4.5	14.5
DIRECT NON-LABOR	27.1	54.2	54.2	54.2	189.8	85.8	275.6
TOTAL DIRECT CAPITAL	28.5	57.1	57.1	57.1	199.8	90.3	290.1

SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	-	-	-	-	-	21.7	21.7
DIRECT NON-LABOR	-	-	-	-	-	337.6	337.6
TOTAL DIRECT CAPITAL	-	-	-	-	-	359.2	359.2

SoCalGas Distribution Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	-	-	-	-	-	41.1	41.1
DIRECT NON-LABOR	-	-	-	-	-	393.4	393.4
TOTAL DIRECT CAPITAL	-	-	-	-	-	434.5	434.5

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Summary of SoCalGas Pipeline Replacements to Mitigate Construction/Fabrication Methods	367 & 376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

Schedule

SoCalGas plans to replace the wrinkle bends on lines scheduled to be pressure tested first, so that the construction threats are removed before the pressure tests. These wrinkle bend replacements are scheduled to start in the second half of 2012 and be completed by the end of 2015 (Phase 1A), so the costs were spread evenly over the 3 1/2 year period (approximately 14.3% in 2012, 28.6% in 2013, 28.6% in 2014, and 28.6% in 2015).

The remaining wrinkle bends are scheduled to be replaced during Phase 1B (2016 - 2021). It was estimated that these costs would be spread evenly over the six years (approximately 16.7% / year).

The pre-1946 replacement projects are scheduled to be completed during Phase 1B (2016 - 2021). It was estimated that the costs would be spread evenly over the six years (approximately 16.7% / year).

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Wrinkle Bends	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	1.4	2.9	2.9	2.9	10.0	4.5	14.5
DIRECT NON-LABOR	27.1	54.2	54.2	54.2	189.8	85.8	275.6
TOTAL DIRECT CAPITAL	28.5	57.1	57.1	57.1	199.8	90.3	290.1

Project Description

As explained in Chapter IV of testimony, in an effort to further enhance public safety, non-piggable pipelines that were installed prior to 1946 using historic welding and construction practices that are no longer industry standard are targeted for replacement under the proposed Pipeline Safety Enhancement Plan. Specifically, we propose to address pipeline segments that contain oxy acetylene girth welds and/or wrinkle bends. All pipeline segments known to have these properties are operated by SoCalGas. Some transmission pipelines that meet this criteria also lack sufficient documentation of pressure testing to satisfy the requirements of 49 CFR 192.619(a)(b) or (d), and therefore, are scheduled to be replaced under both the Base Case and Proposed Case. All non-piggable pre-1946 pipeline segments that have not already been identified for replacement under the Base Case are scheduled for replacement as part of the Proposed Case Pipeline Safety Enhancement Plan. Replacement of wrinkle bends located on pipelines that are scheduled to be pressure tested will be coordinated with the pressure testing, so as to take advantage of the pipeline already being removed from service for testing. These coordinated activities may therefore occur in Phase 1A. Remaining wrinkle bends will be targeted for replacement in Phase 1B.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Wrinkle Bends	367
WITNESS	**IN SERVICE DATE**
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Forecast Methodology

The table below shows the detailed calculations of the costs associated with the wrinkle bend replacements.

	Number of Wrinkle Bends	Estimated Labor Cost [3] / Wrinkle Bend Replacement (2011$)	Estimated Non-Labor Cost [3] / Wrinkle Bend Replacement (2011$)	Total Labor Cost (Millions of 2011$)	Total Non-Labor Cost (Millions of 2011$)	Total Cost (Millions of 2011$)
Wrinkle Bends on Lines Scheduled to be Pressure Tested (Scheduled to Be Replaced Second Half of 2012 - 2015) [2]	3996	$ 2,500	$ 47,500	$ 10.0	$ 189.8	$ 199.8
Remaining Wrinkle Bends (Scheduled to Be Replaced 2016 - 2021) [1]	1204	$ 3,750	$ 71,250	$ 4.5	$ 85.8	$ 90.3
Total	5200			$ 14.5	$ 275.6	$ 290.1

1. The cost to replace a single wrinkle bend was estimated to be approximately $75,000 (2011$), based on historical projects.

2. For wrinkle bends on lines scheduled to be pressure tested, SoCalGas assumed that there would be some efficiency gains since some of the replacements would be in the same vicinity as other work to prepare the pipelines for pressure testing. For this reason, SoCalGas estimated the average cost to replace a wrinkle bend to be $50,000 (2011$) on lines scheduled to be pressure tested.

3. It was estimated that approximately 5% of the cost would be labor, and the remaining 95% would be non-labor.

Schedule

SoCalGas plans to replace the wrinkle bends on lines scheduled to be pressure tested first, so that the construction threats are removed before the pressure tests. These wrinkle bend replacements are scheduled to start in the second half of 2012 and be completed by the end of 2015 (Phase 1A), so the costs were spread evenly over the 3 1/2 year period (approximately 14.3% in 2012, 28.6% in 2013, 28.6% in 2014, and 28.6% in 2015).

The remaining wrinkle bends are scheduled to be replaced during Phase 1B (2016 - 2021). It was estimated that these costs would be spread evenly over the six years (approximately 16.7% / year).

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	-	-	-	-	-	21.7	21.7
DIRECT NON-LABOR	-	-	-	-	-	337.6	337.6
TOTAL DIRECT CAPITAL	-	-	-	-	-	359.2	359.2

Project Description

As explained in Chapter IV of the testimony, in an effort to further enhance public safety, non-piggable pipelines that were installed prior to 1946 using historic welding and construction practices that are no longer industry standard are targeted for replacement under the proposed Pipeline Safety Enhancement Plan. Specifically, we propose to address pipeline segments that contain oxy acetylene girth welds and/or wrinkle bends. All pipeline segments known to have these properties are operated by SoCalGas. Some transmission pipelines that meet this criteria also lack sufficient documentation of pressure testing to satisfy the requirements of 49 CFR 192.619(a)(b) or (d), and therefore, are scheduled to be replaced under both the Base Case and Proposed Case. All non-piggable pre-1946 pipeline segments that have not already been identified for replacement under the Base Case are scheduled for replacement as part of the Proposed Case Pipeline Safety Enhancement Plan.

The costs shown here are for SoCalGas Transmission.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

Forecast Methodology

This high level estimate of the Phase 1B (2016 - 2021) cost to replace the pre-1946 pipeline segments was based on a variety of methods. These include a cost estimating matrix provided by a third party engineering firm, System Planning Engineering and Consulting Services (SPEC Services) and specific pipeline estimates provided by SPEC Services. The matrix is shown below.

Pipeline Replacement Cost ($/foot) Length (miles)						
Line Size (In)	**0.00 to 0.10**	**0.11 to 0.50**	**0.51 to 1.00**	**1.10 to 5.00**	**5.10 to 10.00**	**10.10 to More**
2 in	$970/ft	$702/ft	$622/ft	$588/ft	$585/ft	$583/ ft
4 in	$977/ft	$709/ft	$628/ft	$594/ft	$591/ft	$590/ ft
6 in	$985/ft	$718/ft	$636/ft	$602/ft	$599/ft	$597/ ft
8 in	$1091/ft	$803/ft	$715/ft	$679/ft	$676/ft	$674/ ft
10 in	$1091/ft	$818/ft	$729/ft	$692/ft	$690/ft	$688/ ft
12 in	$1107/ft	$833/ft	$743/ft	$706/ft	$703/ft	$702/ ft
14 in	$1241/ft	$939/ft	$838/ft	$797/ft	$794/ft	$792/ ft
16 in	$1246/ft	$944/ft	$842/ft	$801/ft	$798/ft	$796/ ft
18 in	$1255/ft	$952/ft	$850/ft	$809/ft	$806/ft	$804/ ft
20 in	$1325/ft	$941/ft	$912/ft	$870/ft	$867/ft	$865/ ft
22 in	$1332/ft	$947/ft	$918/ft	$875/ft	$872/ft	$870/ ft
24 in	$1339/ft	$953/ft	$923/ft	$881/ft	$878/ft	$876/ ft
26 in	$1517/ft	$1057/ft	$1022/ft	$972/ft	$968/ft	$966/ ft
28 in	$1526/ft	$1065/ft	$1029/ft	$979/ft	$976/ft	$973/ ft
30 in	$1658/ft	$1182/ft	$1146/ft	$1093/ft	$1090/ft	$1087/ ft
32 in	$1738/ft	$1252/ft	$1216/ft	$1162/ft	$1158/ft	$1156/ ft
34 in	$1754/ft	$1265/ft	$1229/ft	$1175/ft	$1171/ft	$1169/ ft
36 in	$1771/ft	$1279/ft	$1243/ft	$1188/ft	$1185/ft	$1182/ ft
Matrix based on Type 3 - Primary Roadway: Pipeline installation within Primary Roadway assumes asphalt/concrete paving, minimum 48" cover, slurry backfill, minimum 2-lane workspace, high density substructures, heavy traffic control, no environmental restrictions, and restricted working hours (9am- 3:30pm).*						

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

The table below shows the line numbers, the mileage of the pre-1946 segments, and the estimated cost to replace those segments.

Pipeline	Pre-1946 Mileage	Labor	Non-Labor	Total Estimated Cost
85 North	31.07	$ 5,919,551	$ 112,471,468.04	$ 118,391,019
85 South	5.63	$ 1,446,713	$ 27,487,544.44	$ 28,934,257
103	8.53	$ 1,625,162	$ 30,878,069.60	$ 32,503,231
104	0.10	$ 19,052	$ 361,993.78	$ 381,046
404	4.03	$ 880,122	$ 16,722,325.61	$ 17,602,448
1003	0.19	$ 41,371	$ 786,053.53	$ 827,425
1026	38.50	$ 3,671,125	$ 139,875,273.29	$ 143,546,398
1031	0.78	$ 153,295	$ 2,912,595.63	$ 3,065,890
Pipeline Total	88.83	$ 13,756,391	$ 331,495,324	$ 345,251,714
Supplemental Costs[1]		$ 7,920,150	$ 6,072,116	$ 13,992,267
Total	88.83	$ 21,676,541	$ 337,567,440	$ 359,243,981

Cost estimates are shown in 2011$.

1.These supplemental labor and non labor costs are for the support services within the company that will be necessary to implement the PSEP. Included are customer and public outreach, fleets, building and real estate, training, environment and safety, permitting, right-of –way, legal, human resources, Information technology, Accounting and Finance, etc… This is part of the larger Pipeline Safety Enhancement Program, and these costs were allocated between SoCalGas Transmission, SoCalGas Distribution, SDG&E Transmission and SDG&E Distribution based on pipeline mileage.

The table below shows a summary of the pre-1946 pipeline replacement costs, in millions of 2011 dollars. It was estimated that the costs would be spread evenly over the Phase 1B years (approximately 16.7% / year).

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Total Costs	0%	0%	0%	0%	0%	100%	
Labor	$ -	$ -	$ -	$ -	$ -	$ 21.7	$ 21.7
Non-Labor	$ -	$ -	$ -	$ -	$ -	$ 337.6	$ 337.6
Total	$ -	$ -	$ -	$ -	$ -	$ 359.2	$ 359.2

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Transmission Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe	367
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

Schedule

These pre-1946 replacement projects are scheduled to be completed during Phase 1B (2016 - 2021). It was estimated that the costs would be spread evenly over the six years (approximately 16.7% / year).

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

PROJECT COST ($000,000 IN 2011$)	2012	2013	2014	2015	2012-2015	2016-2021	Total
DIRECT LABOR	-	-	-	-	-	41.1	41.1
DIRECT NON-LABOR	-	-	-	-	-	393.4	393.4
TOTAL DIRECT CAPITAL	-	-	-	-	-	434.5	434.5

Project Description

As explained in Chapter IV of the testimony, in an effort to further enhance public safety, non-piggable pipelines that were installed prior to 1946 using historic welding and construction practices that are no longer industry standard are targeted for replacement under the proposed Pipeline Safety Enhancement Plan. Specifically, we propose to address pipeline segments that contain oxy acetylene girth welds and/or wrinkle bends. All pipeline segments known to have these properties are operated by SoCalGas. Some transmission pipelines that meet this criteria also lack sufficient documentation of pressure testing to satisfy the requirements of 49 CFR 192.619(a)(b) or (d), and therefore, are scheduled to be replaced under both the Base Case and Proposed Case. All non-piggable pre-1946 pipeline segments that have not already been identified for replacement under the Base Case are scheduled for replacement as part of the Proposed Case Pipeline Safety Enhancement Plan.

The costs shown here are for SoCalGas Distribution.

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

Forecast Methodology

This high level estimate of the Phase 1B (2016 - 2021) cost to replace the pre-1946 pipeline segments was based on a cost estimating matrix provided by a third party engineering firm, System Planning Engineering and Consulting Services (SPEC Services). This matrix is shown below.

Pipeline Replacement Cost ($/foot) Length (miles)						
Line Size (In)	**0.00 to 0.10**	**0.11 to 0.50**	**0.51 to 1.00**	**1.10 to 5.00**	**5.10 to 10.00**	**10.10 to More**
2 in	$970/ft	$702/ft	$622/ft	$588/ft	$585/ft	$583/ ft
4 in	$977/ft	$709/ft	$628/ft	$594/ft	$591/ft	$590/ ft
6 in	$985/ft	$718/ft	$636/ft	$602/ft	$599/ft	$597/ ft
8 in	$1091/ft	$803/ft	$715/ft	$679/ft	$676/ft	$674/ ft
10 in	$1091/ft	$818/ft	$729/ft	$692/ft	$690/ft	$688/ ft
12 in	$1107/ft	$833/ft	$743/ft	$706/ft	$703/ft	$702/ ft
14 in	$1241/ft	$939/ft	$838/ft	$797/ft	$794/ft	$792/ ft
16 in	$1246/ft	$944/ft	$842/ft	$801/ft	$798/ft	$796/ ft
18 in	$1255/ft	$952/ft	$850/ft	$809/ft	$806/ft	$804/ ft
20 in	$1325/ft	$941/ft	$912/ft	$870/ft	$867/ft	$865/ ft
22 in	$1332/ft	$947/ft	$918/ft	$875/ft	$872/ft	$870/ ft
24 in	$1339/ft	$953/ft	$923/ft	$881/ft	$878/ft	$876/ ft
26 in	$1517/ft	$1057/ft	$1022/ft	$972/ft	$968/ft	$966/ ft
28 in	$1526/ft	$1065/ft	$1029/ft	$979/ft	$976/ft	$973/ ft
30 in	$1658/ft	$1182/ft	$1146/ft	$1093/ft	$1090/ft	$1087/ ft
32 in	$1738/ft	$1252/ft	$1216/ft	$1162/ft	$1158/ft	$1156/ ft
34 in	$1754/ft	$1265/ft	$1229/ft	$1175/ft	$1171/ft	$1169/ ft
36 in	$1771/ft	$1279/ft	$1243/ft	$1188/ft	$1185/ft	$1182/ ft
Matrix based on Type 3 - Primary Roadway: Pipeline installation within Primary Roadway assumes asphalt/concrete paving, minimum 48" cover, slurry backfill, minimum 2-lane workspace, high density substructures, heavy traffic control, no environmental restrictions, and restricted working hours (9am- 3:30pm).*						

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

The table below shows the line numbers, the mileage of the pre-1946 segments, and the estimated cost to replace those segments.

Pipeline	Pre-1946 Mileage	Labor (5% of Total)	Non-Labor (95% of Total)	Total Estimated Cost (Based on SPEC Cost Matrix)
30-02-U	0.05	$ 16,692	$ 317,140.95	$ 333,833
30-18	0.14	$ 34,681	$ 658,946.99	$ 693,628
32-116-2	4.45	$ 847,828	$ 16,108,723.30	$ 16,956,551
33-37	1.05	$ 221,384	$ 4,206,287.76	$ 4,427,671
36-37	18.89	$ 3,978,761	$ 75,596,458.06	$ 79,575,219
36-8-01	0.83	$ 156,672	$ 2,976,760.30	$ 3,133,432
36-8-06	1.64	$ 273,024	$ 5,187,448.66	$ 5,460,472
36-9-09 North	6.47	$ 1,041,813	$ 19,794,446.10	$ 20,836,259
36-9-09 South	2.03	$ 375,151	$ 7,127,863.12	$ 7,503,014
36-9-09-JJ	0.34	$ 64,778	$ 1,230,778.86	$ 1,295,557
36-1001	0.33	$ 73,035	$ 1,387,665.50	$ 1,460,701
36-1002	1.74	$ 311,531	$ 5,919,097.27	$ 6,230,629
36-1032	9.39	$ 1,699,539	$ 32,291,235.08	$ 33,990,774
37-04	0.80	$ 156,491	$ 2,973,325.58	$ 3,129,816
37-15	0.01	$ 1,909	$ 36,266.43	$ 38,175
38-101	7.32	$ 1,394,629	$ 26,497,944.84	$ 27,892,574
38-143	3.94	$ 750,661	$ 14,262,555.01	$ 15,013,216
38-205	6.36	$ 1,211,727	$ 23,022,804.53	$ 24,234,531
38-278	1.56	$ 297,216	$ 5,647,103.00	$ 5,944,319
38-508	19.99	$ 3,164,352	$ 60,122,681.45	$ 63,287,033
38-603	0.17	$ 32,389	$ 615,389.43	$ 647,778
38-931	1.78	$ 339,131	$ 6,443,489.32	$ 6,782,620
38-959	0.46	$ 87,773	$ 1,667,694.84	$ 1,755,468
38-980	8.10	$ 1,543,237	$ 29,321,496.34	$ 30,864,733
38-981	5.35	$ 1,019,298	$ 19,366,667.33	$ 20,385,966
42-12	0.00	$ 764	$ 14,506.57	$ 15,270
42-46	0.57	$ 125,687	$ 2,388,045.23	$ 2,513,732
42-46-F	0.00	$ 818	$ 15,542.76	$ 16,361

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
SoCalGas Distribution Pipeline Replacements to Mitigate Construction/Fabrication Methods - Pre-1946 Non-Piggable Pipe	376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	12/31/2021

Pipeline	Pre-1946 Mileage	Labor (5% of Total)	Non-Labor (95% of Total)	Total Estimated Cost (Based on SPEC Cost Matrix)
43-121	0.35	$ 114,126	$ 2,168,385.80	$ 2,282,511
45-1001	2.67	$ 508,697	$ 9,665,233.98	$ 10,173,931
Pipeline Total	106.76	$ 19,843,789	$ 377,031,984	$ 396,875,773
Supplemental Costs[1]		$ 21,289,510	$ 16,321,960	$ 37,611,470
Total	106.76	$ 41,133,299	$ 393,353,944	$ 434,487,243

Cost estimates are shown in 2011$.

1.These supplemental labor and non labor costs are for the support services within the company that will be necessary to implement the PSEP. Included are customer and public outreach, fleets, building and real estate, training, environment and safety, permitting, right-of –way, legal, human resources, Information technology, Accounting and Finance, etc… This is part of the larger Pipeline Safety Enhancement Program, and these costs were allocated between SoCalGas Transmission, SoCalGas Distribution, SDG&E Transmission and SDG&E Distribution based on pipeline mileage.

The table below shows a summary of the pre-1946 pipeline replacement costs, in millions of 2011 dollars. It was estimated that the costs would be spread evenly over the Phase 1B years (approximately 16.7% / year).

	Phase 1A (2012 - 2015)					Phase 1B (2016 - 2021)	Total
	2012	2013	2014	2015	Total		
Percentage of Total Costs	0%	0%	0%	0%	0%	100%	
Labor	$ -	$ -	$ -	$ -	$ -	$ 41.1	$ 41.1
Non-Labor	$ -	$ -	$ -	$ -	$ -	$ 393.4	$ 393.4
Total	$ -	$ -	$ -	$ -	$ -	$ 434.5	$ 434.5

Schedule

These pre-1946 replacement projects are scheduled to be completed during Phase 1B (2016 - 2021). It was estimated that the costs would be spread evenly over the six years (approximately 16.7% / year).

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Phase 2 Cost Estimates	367 & 376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	

Project Description

Phase 2 of the proposed Pipeline Safety Enhancement Plan addresses all remaining pre-1970 transmission pipeline segments not fully addressed in Phase 1 that lack sufficient documentation of pressure testing to satisfy the requirements of 49 CFR 192.619(a)(b) or (d). In total, the scope of Phase 2 is estimated to include approximately 2,000 miles of SoCalGas transmission pipeline and less than 100 miles of SDG&E transmission pipeline. An assessment of these lines is underway, and will not be completed until July 2012. Based on a preliminary review, it is anticipated that some of these pipeline segments will require pressure testing or replacement to meet the Commission's directives in D.11-06-017.

Forecast Methodology

In the table provided below the Phase 2 Mileage Estimate is shown. In total, the scope of Phase 2 is estimated to include approximately, 2,000 miles of SoCalGas transmission pipeline and 100 miles of SDG&E transmission pipeline.

	Total Pre-1970 Mileage	Criteria Miles Addressed in Phase 1	Accelerated Miles Replaced in Phase 1 (Doesn't Include Looping)	Accelerated Miles Pressure Tested in Phase 1	Miles of Non-Criteria Construction / Fabrication Threats Removed in Phase 1	Estimated Remaining Miles in Phase 2	Estimated Remaining Miles (Rounded)
	a	b	c	d	e	a-(b+c+d+e)	
SoCalGas Mileage	2688	320	118	184	195	**1871**	**2000**
SDG&E Mileage	168	63	21	15	0	**69**	**100**
Total Mileage	2856	383	139	199	195	**1940**	**2100**

CAPITAL WORKPAPER

WORKPAPER TITLE	FERC ACCT.
Phase 2 Cost Estimates	367 & 376
WITNESS	**IN SERVICE DATE**
Joseph Rivera	

In the table provided below an average cost per mile for Pipe Replacement, Pressure Test and In-Line Inspection is shown assuming Phase 2 costs are similar to Phase 1.

	Criteria Miles a	Accelerated Miles b	Total Miles (a+b)	Total Cost	Average Cost / Mile (Criteria + Accelerated)	Average Cost / Mile (Range)
Pipe Replacement	156	139	295	$ 1,057,000,000	$ 3,583,050.85	$3.5 - 4 million / mile
Pressure Test	206	199	405	$ 194,000,000	$ 479,012.35	$0.5 - 0.6 million / mile
In-Line Inspection	170	551	721	$ 62,000,000	$ 85,991.68	$86,000 / mile

In the table provided below a summary of total miles and cost for Phase 2 is shown. As described on Pg 119 chapter IX-E of testimony we have not yet completed our review of records for Phase 2 pipelines and are unable to provide a scope and estimate for Phase 2 with any level of certainty. In the table below, it is assumed that 40% of Phase 2 transmission pipelines will be addressed using either pressure testing or replacement and apply the same pressure test versus replacement ratio as Phase 1 pipeline segments (approximately 43% pipe replacement and 57% pressure test). It is also assumed that 60% of the total Phase 2 mileage will undergo an In-Line Inspection.

	Miles			Cost (Millions of 2011$)			
	ILI Mileage	Pressure Test Mileage	Pipe Replacement Mileage	ILI O&M	Pressure Test O&M	Pipe Replacement Capital	Total Phase 2 (Rounded)
	(60%)	(57%)	(43%)	($86,000 / mile)	($479,000 / mile)	($3.58 Million / mile)	
SoCalGas	1200	455	345	$ 103.2	$ 218.1	$ 1,235.3	**$1.6 Billion**
SDG&E	60	23	17	$ 5.2	$ 10.9	$ 61.8	**$100 Million**
Total	1260	478	362	$ 108.3	$ 229.0	$ 1,297.0	**$1.7 Billion**

Due to the uncertainty and lack of definition of the scope for Phase 2 and the possibility that the percentage of miles to be addressed could be higher or lower, a range of $1.5 - 3 billion for SoCalGas and $100 million for SDG&E has been assumed.

Schedule

Phase 2 of the proposed Pipeline Safety Enhancement Plan is expected to run in parallel with, and may extend past, the completion of Phase 1B.