2016 Risk Assessment Mitigation Phase Investigation 16-10-016 Workpapers to Catastrophic Damage Involving a High-Pressure Gas Pipeline Failure (Chapter SCG-4-WP)

January 2017



Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (O&M)

					r	Recorded (Dir	ects, 2015 \$0	00)		<u></u>			irects, 2015			
Line										2017	2017	2018	2018	2019	2019	
lo.	Mitigation	Project/Program	Project/Program Description	Status	2011	2012	2013	2014	2015	Low	High	Low	High	Low	High	Forecast Methodolog
			Inspect pipelines on bridges and spans for													
1	Maintenance	Bridge & Span Inspections	issues	В	\$ 1	\$ 2	\$ 4	\$ 6	\$ 5	\$ 6	\$ 6	\$ 6	\$ 6	\$ 6	\$ 6	Base Year
			Inspect high pressure meters for corrosion,													
2		Meter Inspections & Maintenance	leaks, or other potential issues	В	1,652	1,142	2,143	2,600	1,259	1,268	1,402	1,268	1,402	1,268	1,402	Base Year
			Maintain valves with lubrication and													
		Valve Maintenance and Installation	servicing, and replace or install valves													
3		(Transmission)	required for compliance	В	545	7	355	224	1,686	1,698	1,876	1,698	1,876	1,698	1,876	Base Year
			Maintain valves with lubrication and													
		Valve Maintenance and Installation	servicing, and replace or install valves													
4		(Distribution High Pressure)	required for compliance	В	3	22	59	57	57	58	64	58	64	58	64	Base Year
		Regulator Station Inspection and	Inspect regulators to confirm overpressure													
5		Maintenance	protection is in place and maintained	В	773	833	970	950	834	840	928	840	928	840	928	Base Year
6		Pipeline Patrol/Leak Survey	Patrol pipelines for leaks on the ground	B/P	357	424	447	459	467	470	520	470	520	470	520	Base Year
		Maintenance of High Pressure Storage	Maintenance of high pressure storage													
7		Lines	lines	В	3,094	4,376	3,107	2,626	2,733	2,752	3,042	2,752	3,042	2,752	3,042	Base Year
			Maintain compliance through maximo													
8		Condition Based Maximo Work Orders	work order tracking	В	-	-	-	28	627	596	659	596	659	596	659	Base Year
9	Maintenance Subtotal				6,425	6,805	7,085	6,950	7,670	7,688	8,497	7,688	8,497	7,688	8,497	
			Certification and training that is required													
			for all transmission employees to work on													
			company assets. This is mandated by the													
	Qualifications of Pipeline		Federal Code of Regulation (CFR) 49 Part													
10	Personnel	Transmission Pipeline Technician Training	192 Subpart N	В	86	88	92	141	194	195	215	195	215	195	215	Base Year
			Certification and training that is required													
			for all transmission employees to work on													
			company assets. This is mandated by CFR													
11		Transmission Pipeline Specialist Training	49 Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-	-	-	
			Certification and training that is required													
			for all transmission employees to work on													
			company assets. This is mandated by CFR													
12		Transmission Welding Specialist Training	49 Part 192 Subpart N	В	34	34	40	60	61	62	68	62	68	62	68	Base Year
		O ,														
			Certification and training that is required													
			for all transmission employees to work on													
		Transmission Cathodic Protection	company assets. This is mandated by CFR													
13		Specialist Training (and Senior)	49 Part 192 Subpart N	В	1	1	1	1	1	1	1	1	1	1	1	Base Year
			Certification and training that is required													
			for all transmission employees to work on													
			company assets. This is mandated by CFR													
14		Welding Non-Labor	49 Part 192 Subpart N	В	25	25	25	25	25	23	31	23	31	23	31	Base Year
		• • • • • • • • • • • • • • • • • • • •					-									
			Certification and training that is required													
			for all distribution employees to work on													
		Distribution Construction Technician	company assets. This is mandated by CFR													
45		Training	49 Part 192 Subpart N	В	57	83	110	95	96	97	107	97	107	97	107	Base Year
					3,	33		- 33	50		207		207		137	1001
15			L							1						
15			Certification and training that is required	1												
15			Certification and training that is required for all distribution employees to work on													
15		Distribution Energy Technician	for all distribution employees to work on company assets. This is mandated by CFR													

Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (O&M)

						Recorded (Di	rects, 2015 \$0	100)			Forec	ast Range (E	Directs, 2015 \$	6000)		
Line No.	Mitigation	Project/Program	Project/Program Description	Status	2011	2012	2013	2014	2015	2017 Low	2017 High	2018 Low	2018 High	2019 Low	2019 High	Forecast Methodology
17		Distribution Lead Construction Technician	Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	14	14	16	16	15	15	17	15	17	15	17	Base Year
1/		Training	49 Part 192 Subpart N	В	14	14	10	10	15	13	1/	15	1/	13	1/	base real
18		Distribution System Protection Specialist	Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В				_								
10			Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR	Б			-						-	-		
19			49 Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-	-	-	
20	Qualifications of Pipeline Personnel Subtotal				221	248	289	342	396	398	444	398	444	398	444	
21	Requirements for Corrosion Control	Internal Corrosion Consultants	Internal corrosion enhancement	В	-	-	-	-	110	300	900	300	900	300	900	Zero-Based
22		Internal Corrosion Monitoring Equipment	Monitor internal corrosion conditions Install cathodic protection (anodes,	В	-	-	-	-	-	-	-	-	-	-	-	
23			rectifiers, etc.) to protect high pressure pipelines	В	171	175	190	230	215	217	239	217	239	217	239	Base Year
	Requirements for Corrosion		F F													
24	Control Subtotal		This remote monitoring unit (RMU) is designed primarily for monitoring of Cathodic Protection (CP) rectifiers and		171	175	190	230	325	517	1,139	517	1,139	517	1,139	
25	Operations		additional inputs of corrosion monitoring transmitters	В	-	-	-	114	43	43	47	43	47	43	47	Base Year
26			Maintenance of access roads and pipeline right of ways is critical so that compliance is maintained, pipelines can be accessed in a timely manner, third party pipeline damages can be minimized, wildfire damage can be prevented, and the safety of employees and the public are maintained	В/Р	1,420	1,445	1,061	2,048	1,204	4,750	5,250	4,750	5,250	4,750	5,250	Base Year
			When a pipeline is operating "out of class" it needs to be remediated by either replacement or hydro-test because new pipeline installation has different testing requirements depending on the class location. HCAs for natural gas pipelines focus on populated areas which affects class location. HCA identification relies on pipeline-specific information regarding the location, size, and operating characteristics of the line, as well as the identification of structures, specified sites, and their intended usage along the pipeline right-of-													
27		Location	way	B/P	10,485	12,580	4	182	1,248	1,900	2,100	5,700	6,300	11,400	12,600	Zero-Based
28		Utility Conflict Review	Review of right of way and other conflicts and resolve such matters Operations emergency manual is reviewed	В	8	20	23	259	18	19	21	19	21	19	21	Base Year
29			yearly to provide quick response in emergency situations	В	253	313	427	402	327	327	361	327	361	327	361	5-Year Average
30			Material inspection and quality control	В	747	788	3,191	2,188	849	1,475	1,631	1,475	1,631	1,475		5-Year Average
31		Odorization	Engineering Analysis Center (EAC) develops odorant techniques for system	В	316	114	2	134	12	110	122	110	122	110	122	5-Year Average
32	Operations Subtotal	Outrization	develops odorant techniques for system	- 0	13,229	15,259	4,708	5,326	3,701	8,624	9,532			18,124	20,032	J Teal Avelage

2016 Risk Assessment Mitigation Phase SCG-04-WP Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (O&M)

						Recorded (Dir	ects, 2015 \$0	00)			Forec	ast Range (D	Directs, 2015	\$000)		
Line										2017	2017	2018	2018	2019	2019	
No.	Mitigation	Project/Program	Project/Program Description	Status	2011	2012	2013	2014	2015	Low	High	Low	High	Low	High	Forecast Methodology
	Gas Transmission Pipeline															
33	Integrity Management	In-Line Inspection (ILI)	Assessment of transmission pipelines	В	9,433	25,357	23,459	22,662	19,459	29,450	32,550	29,450	32,550	30,875	34,125	Zero-Based
		External Corrosion Direct Assessment														
34		(ECDA)	Assessment of transmission pipelines	В	-	3,319	102	1	4,894	3,135	3,465	3,135	3,465	3,325	3,675	Zero-Based
35		Threat and Risk Assessment	Prioritizing and determining pipelines for the Transmission Integrity Management Program (TIMP)	В	288	1,499	3,885	1,965	2,813	2,744	3,032	2,744	3,032	2,744	3,032	3-Year Average
			Assessing the integrity of current high			B B B B B										
36		Integrity Assessments	pressure pipelines through ILI data	В	3,430	6,099	7,035	8,041	2,622	5,604	6,194	5,604	6.194	5,604	6 104	3-Year Average
30		integrity Assessments	Post assessment mitigation of	ь	3,430	0,055	7,033	0,041	2,022	3,004	0,134	3,004	0,154	3,004	0,154	3-Teal Average
37		Preventative and Mitigation Measures	transmission pipelines	В	63	837	684	1,285	626	822	908	822	908	822	908	3-Year Average
		Treventative und minigation measures	Record search for high-pressure pipelines subject to PSEP replacement/hydrostatic					1,203	020		300		300	OLL.	300	J real //terage
38		High Pressure Pipeline Record Search	testing	В	25	1,161	1,485	0	-	-	-	-	-	-	-	
39		Data Integration - High Pressure Pipeline Database	Pipeline database which encompasses all pipelines in the system	В	2,705	2,272	1,759	1,302	1,545	1,555	1,719	1,555	1,719	1,555	1,719	Base Year
40	Gas Transmission Pipeline Integrity Management Subtotal				15.944	40.544	38.409	35.255	31.960	43.310	47.868	43.310	47.868	44.925	49.653	
	Pipeline Safety Enhancement Program (PSEP): High Pressure							,			,,,,,					
	Testing and Replacement, Valve					1 1 2 3 4										
41	Automation and Replacement	High Pressure Pipeline Replacement	Replacement of HCA pipelines	В	-	-	-	-	-	-	-	-	-	-	-	
			Hydrostatic pressure testing of HCA													
42		High Pressure Pipeline Hydrotesting	pipelines	В	-	7,201	30,068	42,459	60,944	24,750	33,000	14,250	19,000	13,500	110,000	Zero-Based
43		Transmission Valve Automation and Replacement	High pressure pipeline valve automation to help improve response of valve shut-ins	В/Р	-	-	-	-	-	-	-	-	-	-	-	
	PSEP: High Pressure Testing and															
	Replacement, Valve Automation					1 1 2 3 4										
44	and Replacement Subtotal					7,201	30,068	42,459	60,944	24,750	33,000	14,250	19,000	13,500	110,000	
45	TOTAL				\$ 35,990	\$ 70,233	\$ 80,750	\$ 90,560	\$ 104,996	\$ 85,287	\$ 100,480	\$ 78,587	\$ 90,680	\$ 85,152	\$ 189,765	

- Notes:
 Baseline (B) and Proposed (P).
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 Numbers in risk chapter tables may differ due to rounding.
 Numbers in risk chapter tables may differ due to rounding.
 The purpose of Risk Assessment Mitigation Phase (RAMP) is not to request funding. Any funding requests will be made in the General Rate Case (GRC). The forecasts for mitigations are not for funding purposes, but are rather to provide a range for the future GRC filing.
 This range will be refined with supporting testimony in the GRC.

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Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (Capital)

						Recorded (Di	rects, 2015 \$	(000			Fore	cast Range ([Directs, 2015	\$000)				
Line										2017	2017	2018	2018	2019	2019		2017-2019	
No.	Mitigation	Project/Program	Project/Program Description	Status	2011	2012	2013	2014	2015	Low	High	Low	High	Low	High	Low (Sum)	High (Sum)	Forecast Methodology
			Inspect pipelines on bridges and spans						1.									
1	Maintenance	Bridge & Span Inspections	for issues	В	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
			Inspect high pressure meters for															
2		Meter Inspections & Maintenance	corrosion, leaks, or other potential issues	В	72	23	0	239	167	168	186	168	186	168	186	504	558	Base Year
			Maintain valves with lubrication and															
_		Valve Maintenance and Installation	servicing, and replace or install valves															
3		(Transmission)	required for compliance	В	858	508	1,264	2,561	5,390	5,427	5,999	5,427	5,999	5,427	5,999	16,282	17,996	Base Year
			Maintain valves with lubrication and															
		Valve Maintenance and Installation	servicing, and replace or install valves					_										
4		(Distribution High Pressure)	required for compliance	В	6	28	20	5	21	21	23	21	23	21	23	63	69	Base Year
			Inspect regulators to confirm															
		Regulator Station Inspection and	overpressure protection is in place and															
5		Maintenance	maintained	В	94	63	374	112	175	176	194	176	194	176	194	527	583	Base Year
_																		
6		Pipeline Patrol/Leak Survey	Patrol pipelines for leaks on the ground	B/P	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Maintenance of High Pressure Storage	Maintenance of high pressure storage						1									
7		Lines	lines	В	2,010	2,696	3,283	6,663	7,133	7,183	7,939	7,183	7,939	7,183	7,939	21,549	23,817	Base Year
			Maintain compliance through maximo															
8		Condition Based Maximo Work Orders	work order tracking	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
9	Maintenance Subtotal				3,042	3,318	4,941	9,580	12,885	12,975	14,341	12,975	14,341	12,975	14,341	38,925	43,023	
			Certification and training that is required															
			for all transmission employees to work															
			on company assets. This is mandated by															
	Qualifications of Pipeline		the Federal Code of Regulation (CFR) 49	_														
10	Personnel	Transmission Pipeline Technician Trainin	Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Certification and training that is required															
			for all transmission employees to work															
			on company assets. This is mandated by															
11		Transmission Pipeline Specialist Training	CFR 49 Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Certification and training that is required															
			for all transmission employees to work															
			on company assets. This is mandated by															
12		Transmission Welding Specialist Training	CFR 49 Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Certification and training that is required															
			for all transmission employees to work															
		Transmission Cathodic Protection	on company assets. This is mandated by															
13		Specialist Training (and Senior)	CFR 49 Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Certification and training that is required															
			for all transmission employees to work															
			on company assets. This is mandated by															
14		Welding Non-Labor	CFR 49 Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Certification and training that is required															
			for all distribution employees to work on															
		Distribution Construction Technician	company assets. This is mandated by CFR							1								
15		Training	49 Part 192 Subpart N	В	-	-	-	-	-	-	_	-	-	-	-	-	-	
			Certification and training that is required															
			for all distribution employees to work on															
		Distribution Energy Technician	company assets. This is mandated by CFR															
16		Distribution Training	49 Part 192 Subpart N	В														
10	l	PISCIDUCION HAMMING	> i ait 132 Juupait IV			<u>-</u>	L	I	I	L	_L	.l	<u>-</u>	L	.l	<u>-</u>	<u>-</u>	i

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Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (Capital)

						Recorded (D	irects, 2015 \$	6000)			Foreca	ast Range (D		\$000)				
Line										2017	2017	2018	2018	2019	2019		2017-2019	
No.	Mitigation	Project/Program	Project/Program Description	Status	2011	2012	2013	2014	2015	Low	High	Low	High	Low	High	Low (Sum)	High (Sum)	Forecast Methodolo
			Certification and training that is required															
			for all distribution employees to work on															
		Distribution Lead Construction	company assets. This is mandated by CFR															
17		Technician Training	49 Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
		0	, and the second															
			Certification and training that is required															
			for all distribution employees to work on															
			company assets. This is mandated by CFR															
18		Training	49 Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Certification and training that is required															
		Distribution Load System Brotostian	for all distribution employees to work on															
19		Distribution Lead System Protection Specialist Training	company assets. This is mandated by CFR 49 Part 192 Subpart N	В	_	_	_	_		_	_	_	_		_	_	_	
15	Qualifications of Pipeline	Specialist Halling	45 Fait 152 Subpart N	В			-									-		
20	Personnel Subtotal				-	-	-	_		_	-	-	-					
-	Requirements for Corrosion																	
21	Control	Internal Corrosion Consultants	Internal corrosion enhancement	В	-	-	-	-	-	-	-	-	-	-		-	-	
22		Internal Corrosion Monitoring Equipment		В	-	-	-	-	-	280	420	280	420	840	1,260	1,400	2,100	Zero-Based
			Install cathodic protection (anodes,															
.		L	rectifiers, etc.) to protect high pressure	1 .								=c-						
23		Transmission Cathodic Protection	pipelines	В	700	433	462	390	504	507	561	507	561	507	561	1,522	1,682	Base Year
24	Requirements for Corrosion Control Subtotal				700	433	462	390	504	787	981	787	981	1,347	1,821	2,922	3,782	
24	Control Subtotal		This remote monitoring unit (RMU) is		700	433	402	390	504	/6/	901	/6/	961	1,347	1,021	2,922	3,762	
			designed primarily for monitoring of															
			Cathodic Protection (CP) rectifiers and															
		High Pressure Transmission Line Watch	additional inputs of corrosion monitoring															
25	Operations	Dog	transmitters	В	-	-	-	- 1	-	-	-	-	-	-	-	-	-	
			Maintenance of access roads and pipeline															
			right of ways is critical so that compliance															
			is maintained, pipelines can be accessed															
			in a timely manner, third party pipeline															
			damages can be minimized, wildfire															
			damage can be prevented, and the safety															
20		Dieba ef Men	of employees and the public are	B/P														
26		Right of Way	maintained	В/Р	-		-	-		-	-	-				-		
			When a pipeline is operating "out of															
			class" it needs to be remediated by either															
			replacement or hydro-test because new															
			pipeline installation has different testing															
			requirements depending on the class															
			location. HCAs for natural gas pipelines															
			focus on populated areas which affects															
			class location. HCA identification relies on															
			pipeline-specific information regarding				0 0 0 0 0 0											
			the location, size, and operating															
			characteristics of the line, as well as the															
			identification of structures, specified															
		High Consequence Area (HCA) Class	sites, and their intended usage along the	l . l														
27		Location	pipeline right-of-way	B/P	1	-	-	1,987	8,005	4,750	5,250	4,750	5,250	4,750	5,250	14,250	15,750	Zero-Based
.			Review of right of way and other conflicts															
28		Utility Conflict Review	and resolve such matters	В	-	-	-		-	-	-	-	-	-	-	-	-	
			Operations emergency manual is															
29		Operations Emergency Proparedness	reviewed yearly to provide quick	В	_	_						_	_			_	_	
27	***************************************	Operations Emergency Preparedness Quality Assurance Quality Control	response in emergency situations			-	-	-		-	-	-			·	-		
30		(QAQC)	Material inspection and quality control	В	_	-	-	_	_	_	_	-	_	_	_	_	_	
-		(inspection and quarty control															
			Engineering Analysis Center (EAC)															
							1			1								
31	Operations Subtotal	Odorization	develops odorant techniques for system	В	-	-	-	51,962	-	10	11	10	11	10	11	29	32	5-Year Average

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Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (Capital)

					- 1	Recorded (Di	rects, 2015 \$	000)			Foreca	ast Range (D	irects, 2015	\$000)				
Line										2017	2017	2018	2018	2019	2019	2017-2019	2017-2019	
No.	Mitigation	Project/Program	Project/Program Description	Status	2011	2012	2013	2014	2015	Low	High	Low	High	Low	High	Low (Sum)	High (Sum)	Forecast Methodology
	Gas Transmission Pipeline																	
33	Integrity Management	In-Line Inspection (ILI)	Assessment of transmission pipelines	В	95,338	75,772	59,081	37,614	42,839	40,000	60,000	40,000	60,000	44,000	66,000	124,000	186,000	Zero-Based
		External Corrosion Direct Assessment																
34		(ECDA)	Assessment of transmission pipelines	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
			Prioritizing and determining pipelines for															
			the Transmission Integrity Management															
35		Threat and Risk Assessment	Program (TIMP)	В	-	-	28	9	0	-	-	-	-	-	-	-	-	
			Assessing the integrity of current high															
36		Integrity Assessments	pressure pipelines through ILI data	В	443	42	49	1,029	138	306	374	306	374	306	374	918	1,122	5-Year Average
			Post assessment mitigation of			_												
37		Preventative and Mitigation Measures	transmission pipelines	В	37	1	-	1	8	-	-	-	-	-	-	-	-	
			Record search for high-pressure pipelines															
20		Web Berner Bleetler Bernel County	subject to PSEP replacement/hydrostatic															
38	1	High Pressure Pipeline Record Search	testing	В	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Data Integration - High Pressure Pipeline	Pipeline database which encompasses all															
39		Data Integration - High Pressure Pipeline Database	pipeline database which encompasses all pipelines in the system	В								_				_		
39	Gas Transmission Pipeline	Database	pipelines in the system	В	-		-	-	-	-	-	-	-	-	-	-	-	
	Integrity Management																	
40	Subtotal				95,818	75,815	59,159	38,652	42,985	40.306	60,374	40.306	60,374	44,306	66,374	124.918	187,122	
40	Subtotal				33,010	75,615	33,133	30,032	42,383	40,300	00,374	40,300	00,374	44,300	00,374	124,510	107,122	
	Pipeline Safety Enhancement																	
	Program (PSEP): High Pressure																	
	Testing and Replacement, Valve																	
41		High Pressure Pipeline Replacement	Replacement of HCA pipelines	В	-	1,551	21,409	188,922	328,570	40,500	67,500	12,750	21,250	148,500	247,500	201,750	336,250	Zero-Based
	,	, in the second	Hydrostatic pressure testing of HCA			,	,				, , , , , , , , , , , , , , , , , , , ,	,	, , , , , , , , , , , , , , , , , , , ,		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,		
42		High Pressure Pipeline Hydrotesting	pipelines	В	-	-	5,063	15,159	7,331	-	-	-	-	-	-	-	-	
			High pressure pipeline valve automation							*								
		Transmission Valve Automation and	to help improve response of valve shut-															
43		Replacement	ins	B/P	-	-	-	18,496	53,814	55,500	92,500	55,500	92,500	52,500	87,500	163,500	272,500	Zero-Based
	PSEP: High Pressure Testing																	
	and Replacement, Valve																	
	Automation and Replacement																	
44	Subtotal				-	1,551	26,473	222,577	389,715	96,000	160,000	68,250	113,750	201,000	335,000	365,250	608,750	
45	TOTAL				\$ 99,560	\$ 81,118	\$ 91,035	\$ 325,149	\$ 454,094	\$ 154,828	\$ 240,956	\$ 127,078	\$ 194,706	\$ 264,388	\$ 422,796	\$ 546,294	\$ 858,458	

- Baseline (B) and Proposed (P).
- Buseline (b) and Projusce (P).

 Numbers in risk chapter tables may differ due to rounding.

 The purpose of Risk Assessment Mitigation Phase (RAMP) is not to request funding. Any funding requests will be made in the General Rate Case (GRC). The forecasts for mitigations are not for funding purposes, but are rather to provide a range for the future GRC filing.

 This range will be refined with supporting testimony in the GRC.

SCG-04-WP

Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (GRC Total - O&M)

						Recorded (D	irects, 2015 \$	000)					Forec	ast Range ([Directs, 2015	\$000)					
Line No.	Mitigation	Project/Program	Project/Program Description	Status	GRC 2011	GPC 2012	GPC 2012	GPC 2014	GPC 201E	Non-GRC 2015	O&M Total 2015	GRC 2017 Low	GRC 2017 High	GRC 2018 Low	GRC 2018 High	GRC 2019 Low	GRC 2019 High			O&M Total 2019 Low	
NO.	wiitigation	Project/Program	Inspect pipelines on bridges and spans for	Status	GRC 2011	GRC 2012	GRC 2013	GRC 2014	GRC 2015	2015	2015	LOW	nign	LOW	nign	LOW	nign	2019 LOW	ZUIS HIGH	2019 LOW	ZU19 HIgh
1	Maintenance	Bridge & Span Inspections	issues	В	\$ 1	\$ 2	\$ 4	\$ 6	\$ 5	\$ -	\$ 5	\$ 6	\$ 6	\$ 6	\$ 6	\$ 6	\$ 6	\$ -	\$ -	\$ 6	\$ 6
				<u> </u>		-	<u> </u>						ļ					· · ·	· ·	1	
			Inspect high pressure meters for corrosion,																		
2		Meter Inspections & Maintenance	leaks, or other potential issues	В	1,652	1,142	2,143	2,600	1,259	-	1,259	1,268	1,402	1,268	1,402	1,268	1,402	-	-	1,268	1,402
			Maintain valves with lubrication and																		
		Valve Maintenance and Installation	servicing, and replace or install valves			7				_											
3		(Transmission)	required for compliance Maintain valves with lubrication and	В	545	/	355	224	1,686	-	1,686	1,698	1,876	1,698	1,876	1,698	1,876	-	-	1,698	1,876
		Valve Maintenance and Installation	servicing, and replace or install valves																		
4		(Distribution High Pressure)	required for compliance	В	3	22	59	57	57	-	57	58	64	58	64	58	64	-	_	58	64
		,																			
		Regulator Station Inspection and	Inspect regulators to confirm overpressure																		
5		Maintenance	protection is in place and maintained	В	773	833	970	950	834	-	834	840	928	840	928	840	928	-	-	840	928
															-00						
6		Pipeline Patrol/Leak Survey	Patrol pipelines for leaks on the ground	B/P	357	424	447	459	467	-	467	470	520	470	520	470	520	-	-	470	520
7		Maintenance of High Pressure Storage Lines	Maintenance of high pressure storage lines	В	3,094	4,376	3,107	2,626	2,733	_	2,733	2,752	3,042	2,752	3,042	2,752	3,042	_		2,752	3,042
		Lines	Maintain compliance through maximo	-	3,034	4,370	3,107	2,020	2,733		2,733	2,732	3,042	2,732	3,042	2,732	3,042			2,732	3,042
8		Condition Based Maximo Work Orders	work order tracking	В	-	-	-	28	627	-	627	596	659	596	659	596	659	-	-	596	659
9	Maintenance Subtotal		Ĭ		6,425	6,805	7,085	6,950	7,670	-	7,670	7,688	8,497	7,688	8,497	7,688	8,497	-	-	7,688	8,497
	Qualifications of Pipeline		Certification and training that is required for all transmission employees to work on company assets. This is mandated by the Federal Code of Regulation (CFR) 49 Part																		
10	Personnel	Transmission Pipeline Technician Training		В	86	88	92	141	194	-	194	195	215	195	215	195	215	-	-	195	215
11		Transmission Pipeline Specialist Training	Certification and training that is required for all transmission employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	-	_	_	_	_		_	-		_	_	_	_	_	_	_	_
12		Transmission Welding Specialist Training	Certification and training that is required for all transmission employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	34	34	40	60	61		61	62	68	62	68	62	68			62	68
12		Transmission weiging specialist Training	49 Part 192 Subpart N	В	34	34	40	00	01	-	01	02	00	02	08	02	- 08	-	-	02	- 00
13		Transmission Cathodic Protection Specialist Training (and Senior)	Certification and training that is required for all transmission employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	1	1	1	1	1	-	1	1	1	1	1	1	1	-	-	1	1
14		Welding Non-Labor	Certification and training that is required for all transmission employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	25	25	25	25	25	_	25	23	31	23	31	23	31	-	-	23	31
15		Distribution Construction Technician Training	Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	57	83	110	95	96	-	96	97	107	97	107	97	107	_	-	97	107
16		Distribution Energy Technician Distribution Training	Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	4	3	5	4	5	-	5	5	5	5	5	5	5	-	_	5	5

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Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (GRC Total - O&M)

Marcia M	-		T				Recorded (D	irects, 2015 \$	000)					Forec	ast Range (I	Directs, 201	15 \$000)					
Personal Control Con		Mitigation	Project/Program	Project/Program Description	Status	GRC 2011	GRC 2012	GRC 2013	GRC 2014	GRC 2015												
The contribution of the co		•											***************************************	<u>y</u>		<u> </u>		<u>.</u>	-			
Contraction of Contraction Control C																						
Description System Protection System Protection System Protection System Protection System Protection System Protection System System System Protection System Syst			Distribution Lead Construction Technician																			
Second Content of Content Protection (second Content of Content				49 Part 192 Subpart N	В	14	14	16	16	15	-	15	15	17	15	17	7 1	5 17	-	-	15	1
Second Content of Content Protection (second Content of Content				Certification and training that is required																		
Temporary Septe 15 Support																						
Control of Control of Section Procession of Control o								6 6 7 8 8 8				6 6 7 8 8 8										
Control Cont	-		Training	49 Part 192 Subpart N	В	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
Description of the property																						
Processor Secretary Secr			Distribution Local Control Destruction					0 0 0 0 0 0 0 0 0 0														
Control Present Companies Present Companies Present Companies Maintening Equations Present Equation Companies Maintening Equation Companies Present Equation Companies Present Equation Companies Present Equation Companies Maintening Equation Companies Present Equation					В	_	-	-	-	-	_	-	_	-	_	_	-	_	_	_	-	
Exercised Control Internal C				·																		
Contract Internal Cornections Multifrage (Lightness) Exercise Contractions Exercise Contractio						221	248	289	342	396	-	396	398	444	398	444	39	8 444	-	-	398	44
Page Persuan Transmission Curroutes Page Persuan Transmission Curroutes Page Persuan Transmission Curroutes Page Persuan Page			Internal Corrosion Consultants	Internal corrosion enhancement	В	-	-	-	-	110	-	110	300	900	300	900	30	0 900	-	-	300	900
Repulsements for Currollan Secretary Product of Transmission Callodic Protection Protect			Internal Corrector Manifestina Equipment	Manitorinternal corresion conditions																		
Receivement for Corrotion Parameters P			internal Corrosion Monitoring Equipment	Monitor Internal Corrosion Conditions	В	-	-	-	-	-		-	-	-	_	-	-	-	-	-	-	-
Recidence for Control of Control of Control of Control of Control Co																						
Requirement for Corrosion Cathodide Protection glaphiles																						
Teammasing Catholic Protection Depliers B 171 175 190 220 215 - 215 219 21																						
Control Substead			Transmission Cathodic Protection		В	171	175	190	230	215	-	215	217	239	217	239) 21	7 239	-	-	217	23
This remote monitoring will (MMU) Secure Transmission Line Warth Segment promotering of clarifolds Protection (IV) residing and clarifolds and continues a continue and continues and continue							475	400		225		225		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		4 430						
Cathodic Protection (Cathodic Protection and Cathodic Protection and Cathodic Protection (Cathodic Protection and Cathodic Protection and Cathodic Protection (Cathodic Protection and Cathodic Protection (Cathodic Protection and Cathodic Protection (Cathodic Protection and Cathodic Protection		Control Subtotal		This remote monitoring unit (RMU) is		1/1	1/5	190	230	325	-	325	517	1,139	517	1,139	51	/ 1,139		-	517	1,13
S				designed primarily for monitoring of																		
Some continued by the continued of the			High Descripe Transmission Line Watch																			
Maintenance of access roads and pipeline right of ways is critical so that compliance is maintained, pepleines and a accessed in a timely manner, bind party pipeline damage can be prevented, and the safety of employees and the public are and a safety of employees and a safety		Operations			В	_	-	_	114	43	_	43	43	47	43	47	7 4	3 47	_	_	43	4
inght of way is critical so that compliance is maintained, pipelines are be accessed in a time/ manner, third party pipeline damage can be prevented, and the safety of employees and the public are maintained. 5 Right of Way When a pipeline is operating "out of class" it needs to be medicated by either replacement or hybro-test because new pipeline installation had different esting requirements depending on the class location. IncAl dentification releas on pipeline-sepecific information regarding the distriction. IncAl soft matters are switch affects class location. IncAl dentification releas on pipeline-sepecific information regarding the distriction of structures, specified sizes, and their inches way and other conflicts and resolve such matters 8 Utility Conflict Review 10 Operations Emergency Preparedness 10 Quality Assurance Quality Control (QAQC) Material inspection and quality control. B 747 788 3,191 2,188 849 - 849 1,475 1,631																						
is maintained, pipelines can be accessed in a time tymanner, third party pipeline damages can be prevented, and the safety of employees and the public are damages can be prevented, and the safety of employees and the public are maintained. Wildfire damage can be prevented, and the safety of employees and the public are maintained. Wildfire damage can be prevented, and the safety of employees and the public are maintained. When a pipeline is operating "out of class" in reeds to be remediated by either replacement of hydro-test because mean prevented depending on the class location. HCA for matural gas pipelines focus on populated areas which affects class location. HCA for matural gas pipelines focus on populated areas which affects class location. HCA for matural gas pipelines focus on populated areas which affects class location. HCA destriction of the line, as well as the identification of structures, specified sites, and their line, as well as the identification of structures, specified sites, and their line, as well as the identification of the line, as well as the identification of structures, specified sites, and their line of the line, as well as the identification of structures, specified sites, and their line of the line, as well as the identification of structures, specified sites, and their line of the line, as well as the identification of structures, specified sites, and their line of the line, as well as the identification of structures, specified sites, and their line of the line, as well as the identification of structures, specified sites, and their line of the line, as well as the identification of structures, specified sites, and their line of structures, specified site																						
a timely manner, third party pipeline damage can be primitived, wildlife damage can be prevented, and the safety of employees and the public are maintained When a pipeline is operating "out of class" in needs to be remotated by either replacement or hydro-test because new pipeline installation has different testing requirements depending on the class location. HCAs for natural gas pipelines on pipeline-specific information regarding the locations. Step, and specific information regarding the statistic step, and their information regarding the locations. Step, and specific information regarding the locations step, and specific information regarding the locations. Step, and specific information regarding the locations. Step, and specific information regarding the locations. Step, and specific information regarding the locations in the location of the location of the location information regarding the locations in the location information regarding the locations in the location information regarding the location in t																						
damage can be prevented, and the safety of employees and the public are monitoried or employees and the public are enveloped in the class focation. However, the class pipelines produced in the class focation. However, the class of employees and their meters of experiments depending on the class focation. However, the employees are so in the first of experiments of employees and their meters of experiments depending the location, size, and operating characteristics of the line, as well as the elemification of structures, specified sites, and their meters of experiments are experiments and their meters of experiments are experiments. The experiments are experiments are experiments and their meters of experiments are experiments. The experiments are experiments are experiments are experiments and their meters of experiments are experiments. The experiments are experiments are experiments are experiments and their meters of experiments are experiments. The experiments are experimentally and their experiments are experiments. The experiments are experiments are experimentally as an experiment of experiments. The experiments are experimentally as a contract of experiments are experimentally as a contract of experiments. The experiments are experimentally as a contract of experiments are experimentally as a contract of experiments. The experiments are experimentally as a contract of experiments are experimentally as a contract of experiments. The experiments are experimentally as a contract of experiments are experimentally as a contract of experiments. The experiments are experimentally as a contract of experiments are experimentally as a contract of experiments. The experiments are experimentally as a contract of experiments are experimentally as a contract of experiments. The experiments are experimental																						
Second Continue								6 6 7 8 8 8 8				6 6 7 8 8 8										
8/P 1.420 1.445 1.061 2.048 1.204 - 1.204 4.750 5.250 4.750 5.250 4.750 5.250 4.750 When a pipeline is operating "out of class" it needs to be remediated by either replacement or hydro-test because new pipeline installation has different testing requirements depending on the class location. HCAs for natural gas pipelines depending on the class location. HCAs for natural gas pipelines depending on the class location. HCAs for natural gas pipelines of focus on populated areas which affects class location. HCAs for natural gas pipelines of focus on populated areas which affects class location. HCAs for natural gas pipelines of focus on populated areas which affects class location. HCAs for natural gas pipelines of the line, as well of the line, as well of the line, as well of the line																						
it needs to be remediated by either replacement of hydro-test because new pipeline installation has different testing requirement of hydro-test because new pipeline installation has different testing requirements depending on the class location. HCA for natural gas pipelines focus on populated areas withch affects class location. HCA identification relies on pipeline-speedic information regarding the location, size, and operations feather grantscriptions of the line, as well as the identification of structures, specified size, and their intended usage along the pipeline right-of-way. By Utility Conflict Review By 10,485 12,580 4 182 1,248 - 1,248 1,900 2,100 5,700 6,300 11,400 12,600 11,400 11,			Right of Way		B/P	1,420	1,445	1,061	2,048	1,204	_	1,204	4,750	5,250	4,750	5,250	4,75	0 5,250	_		4,750	5,25
it needs to be remediated by either replacement or hydro-test because new pipeline installation has different testing requirement of hydro-test because new pipeline installation has different testing requirements depending on the class location. HCA for natural gas pipelines focus on populated areas which affects class location. HCA identification relies on pipeline-specific information regarding the location, size, and operating characteristics of the line, as well as the identification of structures, specified sizes, and their intended usage along the pipeline right of way and other conflicts and representations of the line, as well as the identification of structures, specified sizes, specified sizes, and their intended usage along the pipeline right of way and other conflicts and resolve such matters and resolve such matters and resolve such matters and resolve such matters. B 8 8 20 23 259 18 - 18 19 21 19 21 19 21 19 Operations emergency manual is reviewed yearly to provide quick response in emergency situations B 253 313 427 402 327 - 327 327 361 327 361 327 361 327 Quality Assurance Quality Control (QAQC) Material inspection and quality control B 747 788 3,191 2,188 849 - 849 1,475 1,631 1,475 1,631 1,475 1,631 1,475 Engineering Analysis Center (EAC) Engineering Analysis Center (EAC)																						
it needs to be remediated by either replacement of hydro-test because new pipeline installation has different testing requirement sepending on the class location. HCA for natural gas pipelines focus on populated areas within affects class location. HCA identification relies on pipeline-specific information regarding the location, size, and operating characteristics of the line, as well as the identification of structures, specified sizes, and their intended usage along the pipeline right of way and other conflicts and resolve such matters. By Utility Conflict Review By 10,485 12,580 4 182 1,248 - 1,248 1,900 2,100 5,700 6,300 11,400 12,600 11,400				When a pipeline is operating "out of class"																		
pipeline installation has different testing requirements depending on the class location. HCAs for natural gas pipelines focus on populated areas which affects class location. HCAs for natural gas pipelines focus on populated areas which affects class location. HCAs for natural gas pipelines focus on populated areas which affects class location. HCAs for natural gas pipelines focus on populated areas which affects class location. HCAs for natural gas pipelines focus on populated areas which affects class location. HCAs for natural gas pipelines focus on populated areas which affects of the line, as well as the identification of structures, specified sizes, and their intended usage along the pipeline right-of-way. By 10,485 12,580 4 182 1,248 - 1,248 1,900 2,100 5,700 6,300 11,400 12,600 11,400 1,500				it needs to be remediated by either																		
requirements depending on the class location. HCAs for natural gas pipelines focus on populated areas which affects class location. HCA identification relies on pipeline-specific information regarding the location, size, and operating characteristics of the line, as well as the identification of structures, specified sites, and their intended usage along the pipeline right-of-location way and other conflicts and resolve such matters 8 Utility Conflict Review Active of the confidence of the co																						
location HCAs for natural gas pipelines focus on populated areas which affects class location. HCA identification relies on pipeline-specific information regarding the location, size, and operating characteristics of the line, as well as the identification of structures, specific distes, and their High Consequence Area (HCA) Class intended usage along the pipeline right-of-location way								6 6 7 8 8 8 8														
class location. HCA identification relies on pipeline-specific information regarding the location, size, and operating characteristics of the line, as well as the identification of structures, specified sites, and their intended usage along the pipeline right-of-Location way B/P 10,485 12,580 4 182 1,248 - 1,248 1,900 2,100 5,700 6,300 11,400 12,600																						
pipeline-specific information regarding the location, size, and operating characteristics of the line, as well as the identification of structures, specified sites, and their intended usage along the pipeline right-of-way High Consequence Area (HCA) Class High Consequence Area																						
Contain Cont																						
of the line, as well as the identification of structures, specified sites, and their intended usage along the pipeline right-of-tocation way B/P 10,485 12,580 4 182 1,248 - 1,248 1,900 2,100 5,700 6,300 11,400 12,600 12,600 12,								0 0 0 0 0 0 0 0 0 0 0														
High Consequence Area (HCA) Class intended usage along the pipeline right-of- uocation				of the line, as well as the identification of																		
Total Control Total Contro			Uh Consequence Asset (UCA) Class																			
Review of right of way and other conflicts and resolve such matters B B 8 20 23 259 18 - 18 19 21 19 21 19 21 1 19 21 19 19 21 1					B/P	10,485	12,580	4	182	1,248	_	1,248	1,900	2,100	5,700	6,300	11,40	0 12,600		-	11,400	12,60
Operations emergency manual is reviewed yearly to provided exprise to the emergency operations. Emergency Preparedness emergency Prepared				Review of right of way and other conflicts																		
yearly to provide quick response in emergency Preparedness emergency situations B 253 313 427 402 327 - 327 361 327 361 327 361 327 327 327 327 327 327 327 327 327 327	-		Utility Conflict Review		-	8	20	23	259	18	-	18	19	21	19	21	1 1	9 21	-	-	19	2:
9 Operations Emergency Preparedness emergency situations B 253 313 427 402 327 - 327 361 327 361 327 361 327 361 - 327 O Quality Assurance Quality Control (QAQC) Material inspection and quality control B 747 788 3,191 2,188 849 - 849 1,475 1,631 1,475 1,631 1,475 1,631 1,475 Engineering Analysis Center (EAC) develops odorant techniques for system B 316 114 2 134 12 - 12 110 122 110 122 110 122 110												0 0 0 0 0 0 0 0										
Engineering Analysis Center (EAC) 1 Odorization develops odorant techniques for system B 316 114 2 134 12 - 12 110 122 110 122 110 122 110	_		Operations Emergency Preparedness		В	253	313	427	402	327	-	327	327	361	327	361	1 32	7 361	-	-	327	36:
Engineering Analysis Center (EAC) 1 Odorization develops odorant techniques for system B 316 114 2 134 12 - 12 110 122 110 122 110 122 110			Quality Assurance Quality Control (QAQC)	Material inspection and quality control	В	747	788	3.191	2.188	849	_	849	1.475	1.631	1.475	1.631	1.47	5 1.631	_	_	1.475	1,63
1 Odorization develops odorant techniques for system B 316 114 2 134 12 - 12 110 122 110 122 - 110 120 - 110			, , , , , , , , , , , , , , , , , , , ,		<u> </u>			-,-,-,	_,	2.3					_,.,,	_,	-, -,					
			Odorization		B	316	114	2	134	12	_	12	110	122	110	122) 11	0 122			110	12
Z Operations Suprotal 13,729 15,759 4,708 5.326 3.701 - 3.701 8.624 9.532 12.424 13,732 18.124 20.032 - - 18.124		Operations Subtotal	5351.2811011	develops odorant techniques for system	В	13,229						3,701	8,624		12,424	13,732					18,124	

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Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (GRC Total - O&M)

						Recorded (D	irects, 2015 \$	000)					Forec	ast Range (I	Directs, 2015	\$000)					
Line No.	Mitigation	Project/Program	Project/Program Description	Status	GRC 2011	GRC 2012	GRC 2013	GRC 2014	GRC 2015	Non-GRC 2015	O&M Total 2015	GRC 2017 Low	GRC 2017 High	GRC 2018 Low	GRC 2018 High	GRC 2019 Low	GRC 2019 High	Non-GRC 2019 Low			O&M Total 2019 High
	Gas Transmission Pipeline	,,	, , , , , , , , , , , , , , , , , , ,	1																	
33	Integrity Management	In-Line Inspection (ILI)	Assessment of transmission pipelines	В	9,433	25,357	23,459	22,662	19,459	-	19,459	29,450	32,550	29,450	32,550	30,875	34,125	-	-	30,875	34,125
		External Corrosion Direct Assessment																			
34		(ECDA)	Assessment of transmission pipelines	В	-	3,319	102	1	4,894	-	4,894	3,135	3,465	3,135	3,465	3,325	3,675	-	-	3,325	3,675
25		Threat and Risk Assessment	Prioritizing and determining pipelines for the Transmission Integrity Management		288	1,499	3,885	1,965	2,813		2012	2,744	3,032	2,744	2.022	2,744	3,032			2,744	3,032
35		Inreat and RISK Assessment	Program (TIMP)	В	288	1,499	3,885	1,965	2,813	-	2,813	2,744	3,032	2,744	3,032	2,744	3,032	-	-	2,744	3,032
36		Integrity Assessments	Assessing the integrity of current high pressure pipelines through ILI data	В	3,430	6,099	7,035	8,041	2,622	-	2,622	5,604	6,194	5,604	6,194	5,604	6,194	-	-	5,604	6,194
			Post assessment mitigation of																		
37		Preventative and Mitigation Measures	transmission pipelines	В	63	837	684	1,285	626	-	626	822	908	822	908	822	908	-	-	822	908
38		High Pressure Pipeline Record Search	Record search for high-pressure pipelines subject to PSEP replacement/hydrostatic testing	В	25	1,161	1,485	0	_	-			_	_	_	_	_	_		-	_
30		riigii i ressure i ipeiirie necora searcii	testing	-	2.5	1,101	1,403	-													
39		Data Integration - High Pressure Pipeline Database	Pipeline database which encompasses all pipelines in the system	В	2,705	2,272	1,759	1,302	1,545	-	1,545	1,555	1,719	1,555	1,719	1,555	1,719	-	_	1,555	1,719
40	Gas Transmission Pipeline Integrity Management Subtota	1			15,944	40,544	38,409	35,255	31,960	-	31,960	43,310	47,868	43,310	47,868	44,925	49,653	-	_	44,925	49,653
41	Pipeline Safety Enhancement Program (PSEP): High Pressure Testing and Replacement, Valve Automation and Replacement		Replacement of HCA pipelines	В	_	_	_	-	_	_		_	-	-	-	-	-	-	-	-	-
			Hydrostatic pressure testing of HCA																		
42		High Pressure Pipeline Hydrotesting	pipelines	В	-	-	-	-	-	60,944	60,944	-	-	-	-	13,500	30,000	-	80,000	13,500	110,000
43		Transmission Valve Automation and Replacement	High pressure pipeline valve automation to help improve response of valve shut-ins	B/P	-	-	-	-	-		-	_	-	_	-	-	-	-	-	-	_
44	PSEP: High Pressure Testing and Replacement, Valve Automatio and Replacement Subtotal				_	-	-			60.944	60.944			_	_	13.500	30.000	_	80.000	13.500	110.000
45	TOTAL			1	\$ 35.990	\$ 63,032	\$ 50,682	\$ 48,102	\$ 44,052		, .	\$ 60 537	\$ 67 480	\$ 64,337	\$ 71 680			¢ .	\$ 80,000		\$ 189,765

- Baseline (B) and Proposed (P).

 Numbers in risk chapter tables may differ due to rounding.

 The purpose of Risk Assessment Mitigation Phase (RAMP) is not to request funding. Any funding requests will be made in the General Rate Case (GRC). The forecasts for mitigations are not for funding purposes, but are rather to provide a range for the future GRC filing.

 This range will be refined with supporting testimony in the GRC.

Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (GRC Total - Capital)

						Recorded (D	irects, 2015 \$	000)					Forec	ast Range (D	Directs, 2015	\$000)		1					
Line No.	Mitigation	Project/Program	Project/Program Description	Status	GRC 2011	GRC 2012	GRC 2013	GRC 2014	GRC 2015	Non-GRC 2015	Capital Total 2015	GRC 2017 Low	GRC 2017 High	GRC 2018 Low	GRC 2018 High	GRC 2019 Low	GRC 2019 High		GRC 2017- 2019 High (Sum)		Non-GRC 2017-2019 High	Capital Total 2017-2019 Low	Capital Total 2017-2019 High
	-		Inspect pipelines on bridges and spans																				
1	Maintenance	Bridge & Span Inspections	for issues	В	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
			Inspect high pressure meters for																				
2		Meter Inspections & Maintenance	corrosion, leaks, or other potential issues	В	72	23	0	239	167		167	168	186	168	186	168	186	504	558			504	558
			Maintain valves with lubrication and									***************************************											
		Valve Maintenance and Installation	servicing, and replace or install valves																				
3		(Transmission)	required for compliance Maintain valves with lubrication and	В	858	508	1,264	2,561	5,390	-	5,390	5,427	5,999	5,427	5,999	5,427	5,999	16,282	17,996	-	-	16,282	17,996
		Valve Maintenance and Installation	servicing, and replace or install valves																				
4		(Distribution High Pressure)	required for compliance	В	6	28	20	5	21		21	21	23	21	23	21	23	63	69			63	69
			Inspect regulators to confirm																				
		Regulator Station Inspection and	overpressure protection is in place and																				
5		Maintenance	maintained	В	94	63	374	112	175		175	176	194	176	194	176	194	527	583			527	583
6		Pipeline Patrol/Leak Survey	Patrol pipelines for leaks on the ground	B/P																			
U		Maintenance of High Pressure Storage	Maintenance of high pressure storage	0/1	·	-	-	-	<u> </u>	<u> </u>	-	-	<u> </u>	-	-	-	-	ļ .	-	·	<u> </u>	-	
7		Lines	lines	В	2,010	2,696	3,283	6,663	7,133		7,133	7,183	7,939	7,183	7,939	7,183	7,939	21,549	23,817			21,549	23,817
			Maintain compliance through maximo																				
8		Condition Based Maximo Work Orders	work order tracking	В	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9	Maintenance Subtotal				3,042	3,318	4,941	9,580	12,885	-	12,885	12,975	14,341	12,975	14,341	12,975	14,341	38,925	43,023	-	-	38,925	43,023
	Qualifications of Pipeline		Certification and training that is required for all transmission employees to work on company assets. This is mandated by the Federal Code of Regulation (CFR) 49	_																			
10	Personnel	Transmission Pipeline Technician Training	g Part 192 Subpart N	В	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
11		Transmission Pipeline Specialist Training	Certification and training that is required for all transmission employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	-	-	-	-		-	-	-	-	-	-	-	-	-		-		-	-
12		Transmission Welding Specialist Training	Certification and training that is required for all transmission employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	_	-	-	_	-	_	-	-	_	_	_	-	-	-	_	-	_	_	_
13		Transmission Cathodic Protection Specialist Training (and Senior)	Certification and training that is required for all transmission employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	_	-	-	_	-	_	-	_	-		-	-	-	-	-	-		-	-
14		Welding Non-Labor	Certification and training that is required for all transmission employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	-	-	_	-		-	-		_	_	-		-	-		-			-
15		Distribution Construction Technician Training	Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	_	_	_	_		_	_		_	_	_	_	_		_		_	_	_
16		Distribution Energy Technician Distribution Training	Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N			-	_	-	-	_	-	_	_		-	-	-	-	_	-	-	_	

Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (GRC Total - Capital)

						Recorded (D	irects, 2015 \$	000)					Forec	ast Range (I	Directs, 2015	5 \$000)							
Line No.	Mitigation	Project/Program	Project/Program Description	Status	GRC 2011	GRC 2012	GRC 2013	GRC 2014	GRC 2015	Non-GRC 2015	Capital Total 2015	GRC 2017 Low	GRC 2017 High	GRC 2018 Low	GRC 2018 High	GRC 2019 Low	GRC 2019 High		GRC 2017- 2019 High (Sum)		Non-GRC 2017-2019 High	Capital Total 2017-2019 Low	Capital Total 2017-2019 High
17		Distribution Lead Construction Technician Training	Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В		_		-		-	-		-	-	-	-	-		_	-		_	-
18			Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	-	-	_	-	-	-	-	-	_	-	-	-	-	-	_	-	_	_	-
19		Distribution Lead System Protection Specialist Training	Certification and training that is required for all distribution employees to work on company assets. This is mandated by CFR 49 Part 192 Subpart N	В	-	-		-	-	-	-		-	_	-	-	-	-		-		_	-
20	Qualifications of Pipeline Personnel Subtotal																						
	Requirements for Corrosion Control	Internal Corrosion Consultants	Internal corrosion enhancement	В		-		-	-	-	-		-		-	-	-					-	-
22		Internal Corrosion Monitoring Equipmen		В	-	-	-	-	-		-	280	420	280	420	840	1,260	1,400	2,100	-		1,400	2,100
23		Transmission Cathodic Protection	Install cathodic protection (anodes, rectifiers, etc.) to protect high pressure pipelines	В	700	433	462	390	504		504	507	561	507	561	507	561	1,522	1,682	-		1,522	1,682
24	Requirements for Corrosion Control Subtotal				700	433	462	390	504		504	787	981	787	981	1,347	1,821					2,922	
25	Operations	High Pressure Transmission Line Watch Dog	This remote monitoring unit (RMU) is designed primarily for monitoring of Cathodic Protection (CP) rectifiers and additional inputs of corrosion monitoring transmitters	В	-		_	-		_	-	-				-	_	-	_	_	_	_	_
			Maintenance of access roads and pipeline right of ways is critical so that compliance is maintained, pipelines can be accessed in a timely manner, third party pipeline damages can be minimized, wildfire damage can be prevented, and the safety of employees and the public are	- 6-																			
26		Right of Way High Consequence Area (HCA) Class	maintained When a pipeline is operating "out of class" it needs to be remediated by either replacement or hydro-test because new pipeline installation has different testing requirements depending on the class location. HCAs for natural gas pipelines focus on populated areas which affects class location. HCA dientification relies on pipeline-specific information regarding the location, size, and operating characteristics of the line, as well as the identification of structures, specified sites, and their intended usage	B/P	-	-	-	-		-				-	-	_					-	-	
27		Location	along the pipeline right-of-way Review of right of way and other conflicts	B/P	1	-	-	1,987	8,005	-	8,005	4,750	5,250	4,750	5,250	4,750	5,250	14,250	15,750	-	-	14,250	15,750
28		Utility Conflict Review	and resolve such matters Operations emergency manual is	В	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-
29		Operations Emergency Preparedness	reviewed yearly to provide quick response in emergency situations	В	_			_	-		_						_			_		- '	
30		Quality Assurance Quality Control (QAQC)	Material inspection and quality control	В		_															Ī .		
			Engineering Analysis Center (EAC)																				
31		Odorization	develops odorant techniques for system	В	-	-	-	51,962	-	-		10		10	11			29			-	29	32
32	Operations Subtotal				1	-	-	53,949	8,005	-	8,005	4,760	5,261	4,760	5,261	4,760	5,261	14,279	15,782	-	-	14,279	15,782

Risk: Catastrophic Damage Involving High-Pressure Pipeline Failure (GRC Total - Capital)

						Recorded (D	irects, 2015 \$	000)		1			Fore	ast Range (D	Directs, 2015	\$000)		1					
Line No.	Mitigation	Project/Program	Project/Program Description	Status	GRC 2011	GRC 2012	GRC 2013	GRC 2014	GRC 2015	Non-GRC 2015	Capital Total 2015	GRC 2017 Low	GRC 2017 High	GRC 2018 Low	GRC 2018 High	GRC 2019 Low	GRC 2019 High		GRC 2017- 2019 High (Sum)	Non-GRC 2017-2019 Low	Non-GRC 2017-2019 High		Capital Total 2017-2019 High
	Gas Transmission Pipeline	,,																					
33		In-Line Inspection (ILI)	Assessment of transmission pipelines	В	95,338	75,772	59,081	37,614	42,839	_	42,839	40,000	60,000	40,000	60,000	44,000	66,000	124,000	186,000			124,000	186,000
		External Corrosion Direct Assessment	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						,		,			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	,		,,,,,,				,	
34		(ECDA)	Assessment of transmission pipelines	В	-	-	-		-	-	-	-				-			-		-		-
35		Threat and Risk Assessment	Prioritizing and determining pipelines for the Transmission Integrity Management Program (TIMP)	В			28		0														
33		Till eat and Nisk Assessment	r rogram (rnvir)				20	,				-		-			-	-	-		-		
36		Integrity Assessments	Assessing the integrity of current high pressure pipelines through ILI data	В	443	42	49	1,029	138	-	138	306	374	306	374	306	374	918	1,122			918	1,122
		· ·	Post assessment mitigation of																				
37		Preventative and Mitigation Measures	transmission pipelines	В	37	1	-	1	8	-	8	-	-	-	-	-	-	-	-	-		-	-
			Record search for high-pressure pipelines subject to PSEP replacement/hydrostatic																				
38		High Pressure Pipeline Record Search	testing	В	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-		-
39		Data Integration - High Pressure Pipeline Database	Pipeline database which encompasses all pipelines in the system	В		-	-	-	-	-	-		-		-	-	-		-				-
40	Gas Transmission Pipeline Integrity Management Subtotal				95,818	75,815	59,159	38,652	42,985	-	42,985	40,306	60,374	40,306	60,374	44,306	66,374	124,918	187,122	-		124,918	187,122
	Pipeline Safety Enhancement Program (PSEP): High Pressure Testing and Replacement, Valve																						
41	Automation and Replacement	High Pressure Pipeline Replacement	Replacement of HCA pipelines	В	-	-	-	-	-	328,570	328,570	40,500	67,500	12,750	21,250	8,500	107,500	61,750	196,250	140,000	140,000	201,750	336,250
			Hydrostatic pressure testing of HCA																				
42		High Pressure Pipeline Hydrotesting	pipelines	В	-	-	-	-	-	7,331	7,331	-	-	-	-	-	-	-	-			-	-
43		Transmission Valve Automation and Replacement	High pressure pipeline valve automation to help improve response of valve shut- ins	B/P	_					53,814	53,814	3,000	4,000	3,000	4,000	52,500	87,500	58,500	95,500	105,000	177,000	163,500	272,500
45	PSEP: High Pressure Testing and Replacement, Valve Automation and Replacement	мерисентент	1113	b/r		-	-	-	-	33,014	33,014	3,000	4,000	3,000	4,000	32,300	67,300	30,300	33,300	103,000	177,000	103,300	2/2,300
44	Subtotal				-		-	-	-	389,715	389,715	43,500	71,500	15,750	25,250	61,000	195,000	120,250	291,750	245,000	317,000	365,250	608,750
45	TOTAL				\$ 99,560	\$ 79,567	\$ 64,562	\$ 102,572	\$ 64,379			\$ 102,328	\$ 152,456			\$ 124,388			\$ 541,458	\$ 245,000	\$ 317,000	\$ 546,294	\$ 858,458

Notes:
- Baseline (B) and Proposed (P).
- Numbers in risk chapter tables may differ due to rounding.
- The purpose of Risk Assessment Mitigation Phase (RAMP) is not to request funding. Any funding requests will be made in the General Rate Case (GRC). The forecasts for mitigations are not for funding purposes, but are rather to provide a range for the future GRC filing.
This range will be refined with supporting testimony in the GRC.