

**2016 Risk Assessment Mitigation Phase  
Investigation 16-10-015  
Workpapers to  
Wildfires Caused by SDG&E Equipment  
(Including Third Party Pole  
Attachments)  
(Chapter SDG&E-1-WP)**

January 2017



2016 Risk Assessment Mitigation Phase  
SDGE-01-WP  
Risk: Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) (O&M)

Line No.	Mitigation	Project/Program	Project/Program Description	Status	Recorded (Directs, 2015 \$000)					Forecast Range (Directs, 2015 \$000)						Forecast Methodology
					2011	2012	2013	2014	2015	2017 Low	2017 High	2018 Low	2018 High	2019 Low	2019 High	
1	Inspection, Repair, Maintenance & Replacement Programs <sup>1</sup>	Quality Assurance/Quality Control (QA/QC) Program	Annually inspect 1/3 of the facilities within the HRFA and repair potential sources of ignition before fire season	B	\$ -	\$ -	\$ -	\$ 315	\$ 370	\$ 370	\$ 481	\$ 370	\$ 481	\$ 370	\$ 481	Trend
2		Substation Petro Pipe Maintenance	Regularly inspect and resolve clogs in petro pipes	B	472	377	443	227	245	353	459	353	459	353	459	5-Year Average
3		Long Span Inspection and Repair	Inspect and repair long spans	P						500	650	500	650	500	650	Zero-Based
4		Tie Line Assessments	SDG&E performs Transmission Line Assessments for every transmission line in the HRFA on a three year cycle. Assessments includes review of clearances for 69kV phase to phase, 69kV to 12kV, phase to communication, phase to ground, and other issues (e.g. leaning poles, insulator swing). The three year cycle will requires review of 1/3 of the HRFA transmission lines every year	B	2	115	26	91	22	50	65	25	33	25	33	Zero-Based
5		Fire Risk Mitigation (FIRM)	Examine distribution circuits in the backcountry and develop projects to harden the system based on known conditions	B	11	12	112	348	-	2	3	2	3	2	3	Zero-Based
6	Inspection, Repair, Maintenance & Replacement Programs Subtotal				485	504	581	981	637	1,275	1,658	1,250	1,626	1,250	1,626	
7	Vegetation Management	Tree Trimming	Inspect and maintain approx 400,000 trees that have the potential to encroach within the minimum required compliance distance between vegetation and overhead power lines	B	18,348	20,180	20,394	21,698	20,000	20,155	26,202	20,155	26,202	20,155	26,202	5-Year Average
8		Pole Brushing	Clear flammable brush and vegetation away from SDG&E distribution poles, subject to CA Public Resource Code (PRC), section 4292	B	3,407	3,741	3,176	3,166	3,100	3,373	4,385	3,373	4,385	3,373	4,385	5-Year Average
9		Joint Power Line Inspection with CalFire	SDG&E working jointly with CalFire to inspect lines that are going through areas of higher vegetation and known wind and discuss what their thoughts are about potential ignition with our knowledge of how the system is built and come to some agreements on which areas should be potentially re-engineered or perhaps moved or perhaps prescribed burns in areas to reduce vegetation/fuels under power lines etc.	P						25	33	25	33	25	33	Zero-Based
10	Vegetation Management Subtotal				21,755	23,921	23,570	24,864	23,100	23,553	30,620	23,553	30,620	23,553	30,620	
11	Legal and Regulatory <sup>1</sup>	Marker Balls and Avian Protection Equipment	Marker balls are a visual warning to prevent aircrafts from contacting electric facilities. Avian protection covers-up electric facilities so that large birds are not electrocuted	B	-	-	-	6	556	500	650	500	650	500	650	Zero-Based
12		Mylar Balloon Replacement	Market and adopt non-conductive mylar balloon to eliminate threat of mylar balloon contacting electric lines as source of ignition	B	-	-	-	7	187	150	195	100	130	75	98	Zero-Based
13	Legal and Regulatory Subtotal				-	-	-	13	743	650	845	600	780	575	748	

2016 Risk Assessment Mitigation Phase  
SDGE-01-WP  
Risk: Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) (O&M)

Line No.	Mitigation	Project/Program	Project/Program Description	Status	Recorded (Directs, 2015 \$000)					Forecast Range (Directs, 2015 \$000)						Forecast Methodology
					2011	2012	2013	2014	2015	2017 Low	2017 High	2018 Low	2018 High	2019 Low	2019 High	
14	Rapid Response	Helo and Sunbird Availability	Contract helo support during high fire season to support fire suppression	B	15	1,652	1,750	1,819	2,218	1,750	2,275	1,750	2,275	1,750	2,275	Zero-Based
15		Crew Staging and Mobilization	During Red Flag events, crews are stationed in high wind areas and are ready to react in the event of an outage	B	-	-	1,500	1,300	800	1,300	1,690	1,300	1,690	1,300	1,690	Trend
16		Mobile Command Centers	Field mobile command centers assist in fighting active fires so they can be suppressed and controlled quickly	B	-	-	-	-	-	500	650	500	650	500	650	Zero-Based
17		Utility Wildfire Prevention Teams (Capstone)	Teams follow electric line crews at heightened fire risk times to ensure active line work does not cause fires	B	-	-	1,897	2,546	2,067	2,170	2,821	2,170	2,821	2,170	2,821	3-Year Average
18		Fire Brigade (Capstone)	Fight substation and structure fire using typical fire control facilities and fire suppression foam trailers	B	1,349	1,354	563	-	400	482	627	482	627	482	627	Trend
19		Community Outreach Programs	Work with fire agencies and other community outreach groups for fire awareness, preparation, control and public education to reduce fire risk	B	100	100	100	100	100	75	98	75	98	75	98	Zero-Based
20		Field Patrols	Crew required when circuit is de-energized to visually confirm the continuity of the circuit before it is re-energized for safety	B	55	55	55	55	55	55	72	55	72	55	72	5-Year Average
21		Coordination with Communications Infrastructure Providers (CIP)	Telecommunications Equipment Attachment Management System (TEAMS) program to communicate/coordinate with CIP providers to clear CIP facilities safety issues attached to SDG&E poles	B	20	20	20	20	20	20	26	20	26	20	26	5-Year Average
22	Rapid Response Subtotal				1,539	3,181	5,885	5,840	5,660	6,352	8,259	6,352	8,259	6,352	8,259	
23	Monitoring and Detection	Weather Stations	Maintenance and/or replacement of weather equipment and web-based forecasting system behind the FPI	B	-	-	-	-	-	425	553	425	553	425	553	Zero-Based
24		Weather Forecasting Models	Maintain, replace, recalibrate and check over 170 weather stations within service territory. Regular upgrade of computer hardware and processors to run data analytics	B	-	-	80	100	118	118	153	118	153	118	153	Trend
25		Santa Ana Wildfire Threat Index (SAWTI)	Maintain and upgrade SAWTI, which establishes data sharing between internal meteorologists and fire agencies	B	-	-	-	-	-	20	26	20	26	20	26	Zero-Based
26		Weather Awareness System	Maintain and upgrade communication tool that allows for real time weather information to support system operations	B	-	-	50	60	90	60	78	66	86	73	95	Trend
27		Wildfire Risk Reduction Model (WRRM)	Licensing agreement payments and enhancements to make model more usable and for ease of navigation	B	-	-	-	123	212	50	65	55	72	61	79	Trend
28		Fire Prevention Index (FPI) Components	The FPI contains inputs that need regular updating and awareness on information such as the greenness of grass layer and fuel moisture	B	-	-	31	31	31	31	40	31	40	31	40	3-Year Average
29		NICS/Scout	Web-based situational tool	P						10	13	10	13	10	13	Zero-Based
30		Partnership with Fuego/Fireball	Fire image equipment that would provide near real-time fire perimeter data	P						900	1,170	900	1,170	900	1,170	Zero-Based
31	Monitoring and Detection Subtotal				-	-	161	314	451	1,614	2,098	1,625	2,113	1,638	2,129	
32	TOTAL				\$ 23,779	\$ 27,606	\$ 30,197	\$ 32,012	\$ 30,591	\$ 33,444	\$ 43,480	\$ 33,380	\$ 43,398	\$ 33,368	\$ 43,382	

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.

<sup>1</sup> Controls/Mitigations for which numbers in risk chapter tables may differ due to calculation errors.

2016 Risk Assessment Mitigation Phase  
SDGE-01-WP  
Risk: Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) (Capital)

Line No.	Mitigation	Project/Program	Project/Program Description	Recorded (Directs, 2015 \$000)						Forecast Range (Directs, 2015 \$000)						2017-2019 Low (Sum)	2017-2019 High (Sum)	Forecast Methodology
				Status	2011	2012	2013	2014	2015	2017 Low	2017 High	2018 Low	2018 High	2019 Low	2019 High			
1	Inspection, Repair, Maintenance & Replacement Programs <sup>1</sup>	Quality Assurance/Quality Control (QA/QC) Program	Annually inspect 1/3 of the facilities within the HRFA and repair potential sources of ignition before fire season	B	\$ -	\$ -	\$ -	\$ -	\$ 920	\$ 920	\$ 1,196	\$ 920	\$ 1,196	\$ 920	\$ 1,196	\$ 2,760	\$ 3,588	Trend
2		Wood to Steel Program - Transmission	Replace transmission poles in higher wind prone areas	B	-	177	957	852	296	1,915	2,490	7,220	9,386	21,191	27,548	30,326	39,424	Zero-Based
3		Wood to Steel Program - Major Projects Transmission	Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability	B	2,466	15,388	5,048	34,481	26,264	16,906	21,978	67,347	87,551	51,912	67,486	136,165	177,015	Zero-Based
4		Wood to Steel Program - Major Projects Distribution	Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability	B	332	109	105	4,564	4,046	1,265	1,645	5,568	7,238	5,185	6,741	12,018	15,624	Zero-Based
5		Tie Line Assessments	SDG&E performs Transmission Line Assessments for every transmission line in the HRFA on a three year cycle. Assessments includes review of clearances for 69KV phase to phase, 69KV to 12KV, phase to communication, phase to ground, and other issues (e.g. leaning poles, insulator swing). The three year cycle will requires review of 1/3 of the HRFA transmission lines every year	B	135	56	94	100	659	120	156	120	156	120	156	360	468	Zero-Based
6		Fire Risk Mitigation (FIRM)	Examine distribution circuits in the backcountry and develop projects to harden the system based on known conditions	B	725	1,166	6,646	17,032	51,688	91,000	118,300	91,000	118,300	91,000	118,300	273,000	354,900	Zero-Based
7		Corrective Maintenance Program	GO 165 mandated program: inspect underground connectors by infrared technology per ESP 120 (upon entry of facility) and replace accordingly	B	10,208	10,492	8,991	9,750	11,677	10,224	13,291	10,224	13,291	10,224	13,291	30,672	39,873	5-Year Average
8		Cleveland National Forest (CNF) - Transmission BC 8165	Consolidating over 70 individual Special Use Permits for existing electric facilities on National Forest lands into one Master Special Use Permit and fire hardening (wood to steel pole replacement and undergrounding) of 5 transmission and 7 distribution lines	B	-	978	(4,010)	1,809	5,578	87,882	114,247	72,842	94,695	61,590	80,067	222,314	289,009	Zero-Based
9		CNF - Distribution	Consolidating over 70 individual Special Use Permits for existing electric facilities on National Forest lands into one Master Special Use Permit and fire hardening (wood to steel pole replacement and undergrounding) of 5 transmission and 7 distribution lines	B	208	339	315	198	956	47,812	62,156	63,704	82,815	66,949	87,034	178,465	232,005	Zero-Based
10		FIRM/Wire Mitigation Program	Focusing on both feeder and branch lines within the Fire Threat Zone (FTZ), replace existing hardware. Replace small copper conductor with stronger new aluminum conductor	P	-	-	-	-	-	3,000	3,900	3,000	3,900	3,000	3,900	9,000	11,700	Zero-Based
11	Inspection, Repair, Maintenance & Replacement Programs Subtotal				14,074	28,705	18,146	68,786	102,084	261,044	339,359	321,945	418,528	312,091	405,719	895,080	1,163,606	

2016 Risk Assessment Mitigation Phase  
SDGE-01-WP  
Risk: Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) (Capital)

Line No.	Mitigation	Project/Program	Project/Program Description	Status	Recorded (Directs, 2015 \$000)					Forecast Range (Directs, 2015 \$000)						2017-2019 Low (Sum)	2017-2019 High (Sum)	Forecast Methodology
					2011	2012	2013	2014	2015	2017 Low	2017 High	2018 Low	2018 High	2019 Low	2019 High			
12	Design and Engineering Approaches <sup>1</sup>	Advanced Protection Systems - Distribution	Reclosers coupled with SCADA resources provide operations with real-time capacity to shut off portions of circuits for safety-related reasons caused by weather	B	235	9,231	7,465	3,241	1,747	10,675	13,878	10,675	13,878	10,675	13,878	32,025	41,634	Zero-Based
13		Advanced Protection Systems - Transmission	Reclosers coupled with SCADA resources provide operations with real-time capacity to shut off portions of circuits for safety-related reasons caused by weather	B	1,207	989	715	1,104	2,091	1,373	1,785	1,373	1,785	1,373	1,785	4,119	5,355	Zero-Based
14	Design & Engineering Approaches Subtotal				1,442	10,220	8,180	4,345	3,838	12,048	15,663	12,048	15,663	12,048	15,663	36,144	46,989	
15	Legal and Regulatory <sup>1</sup>	Marker Balls and Avian Protection Equipment	Marker balls are a visual warning to prevent aircrafts from contacting electric facilities. Avian protection covers-up electric facilities so that large birds are not electrocuted	B	-	321	369	403	602	424	551	424	551	424	551	1,272	1,653	Zero-Based
16	Legal and Regulatory Subtotal				-	321	369	403	602	424	551	424	551	424	551	1,272	1,653	
17	Monitoring and Detection	Weather Stations	Maintenance and/or replacement of weather equipment and web-based forecasting system behind the FPI	B	-	729	686	386	465	200	260	200	260	200	260	600	780	Zero-Based
18		Weather Forecasting Models	Maintain, replace, recalibrate and check over 170 weather stations within service territory. Regular upgrade of computer hardware and processors to run data analytics	B	-	270	124	-	369	-	-	-	-	750	975	750	975	Trend
19		Santa Ana Wildfire Threat Index (SAWTI)	Maintain and upgrade SAWTI, which establishes data sharing between internal meteorologists and fire agencies	B	-	350	350	350	-	-	-	-	-	-	-	-	-	Zero-Based
20	Monitoring and Detection Subtotal				-	1,349	1,160	736	834	200	260	200	260	950	1,235	1,350	1,755	
21	TOTAL				\$ 15,516	\$ 40,595	\$ 27,855	\$ 74,270	\$ 107,358	\$ 273,716	\$ 355,833	\$ 334,617	\$ 435,002	\$ 325,513	\$ 423,168	\$ 933,846	\$ 1,214,003	

Notes:

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<sup>1</sup> Controls/Mitigations for which numbers in risk chapter tables may differ due to calculation errors.

2016 Risk Assessment Mitigation Phase  
SDGE-01-WP  
Risk: Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) (GRC Total - O&M)

Line No.	Mitigation	Project/Program	Project/Program Description	Recorded (Directs, 2015 \$000)								Forecast Range (Directs, 2015 \$000)							
				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	Non-GRC 2019 High
1	Inspection, Repair, Maintenance & Replacement Programs <sup>1</sup>	Quality Assurance/Quality Control (QA/QC) Program	Annually inspect 1/3 of the facilities within the HRFA and repair potential sources of ignition before fire season	B	\$ -	\$ -	\$ -	\$ 315	\$ 370	\$ -	\$ 370	\$ 370	\$ 481	\$ 370	\$ 481	\$ -	\$ -	\$ 370	\$ 481
2		Substation Petro Pipe Maintenance	Regularly inspect and resolve clogs in petro pipes	B	-	-	-	-	-	245	245	-	-	-	-	353	459	353	459
3		Long Span Inspection and Repair	Inspect and repair long spans	P								-	500	650	500	650	-	-	500
4		Tie Line Assessments	SDG&E performs Transmission Line Assessments for every transmission line in the HRFA on a three year cycle. Assessments includes review of clearances for 69kV phase to phase, 69kV to 12kV, phase to communication, phase to ground, and other issues (e.g. leaning poles, insulator swing). The three year cycle will requires review of 1/3 of the HRFA transmission lines every year	B	-	-	-	-	-	22	22	-	-	-	-	25	33	25	33
5		Fire Risk Mitigation (FIRM)	Examine distribution circuits in the backcountry and develop projects to harden the system based on known conditions	B	11	12	112	348	-	-	-	2	3	2	3	-	-	2	3
6	Inspection, Repair, Maintenance & Replacement Programs Subtotal				11	12	112	663	370	267	637	872	1,134	872	1,134	378	492	1,250	1,626
7	Vegetation Management	Tree Trimming	Inspect and maintain approx 400,000 trees that have the potential to encroach within the minimum required compliance distance between vegetation and overhead power lines	B	18,348	20,180	20,394	21,698	20,000	-	20,000	20,155	26,202	20,155	26,202	-	-	20,155	26,202
8		Pole Brushing	Clear flammable brush and vegetation away from SDG&E distribution poles, subject to CA Public Resource Code (PRC), section 4292	B	3,407	3,741	3,176	3,166	3,100	-	3,100	3,373	4,385	3,373	4,385	-	-	3,373	4,385
9		Joint Power Line Inspection with CalFire	SDG&E working jointly with CalFire to inspect lines that are going through areas of higher vegetation and known wind and discuss what their thoughts are about potential ignition with our knowledge of how the system is built and come to some agreements on which areas should be potentially re-engineered or perhaps moved or perhaps prescribed burns in areas to reduce vegetation/fuels under power lines etc.	P							-	25	33	25	33	-	-	25	33
10	Vegetation Management Subtotal				21,755	23,921	23,570	24,864	23,100	-	23,100	23,553	30,620	23,553	30,620	-	-	23,553	30,620
11	Legal and Regulatory <sup>1</sup>	Marker Balls and Avian Protection Equipment	Marker balls are a visual warning to prevent aircrafts from contacting electric facilities. Avian protection covers-up electric facilities so that large birds are not electrocuted	B	-	-	-	-	-	556	556	-	-	-	-	500	650	500	650
12		Mylar Balloon Replacement	Market and adopt non-conductive mylar balloon to eliminate threat of mylar balloon contacting electric lines as source of ignition	B	-	-	-	7	187	-	187	150	195	100	130	-	-	75	98
13	Legal and Regulatory Subtotal				-	-	-	7	187	556	743	150	195	100	130	500	650	575	748

2016 Risk Assessment Mitigation Phase  
SDGE-01-WP  
Risk: Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) (GRC Total - O&M)

Line No.	Mitigation	Project/Program	Project/Program Description	Status	Recorded (Directs, 2015 \$000)							Forecast Range (Directs, 2015 \$000)						Non-GRC 2019 Low	Non-GRC 2019 High	O&M Total 2019 Low	O&M Total 2019 High
					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				
14	Rapid Response	Helo and Sunbird Availability	Contract helo support during high fire season to support fire suppression	B	15	1,652	1,750	1,819	2,218	-	2,218	1,750	2,275	1,750	2,275	1,750	2,275	-	-	1,750	2,275
15		Crew Staging and Mobilization	During Red Flag events, crews are stationed in high wind areas and are ready to react in the event of an outage	B	-	-	1,500	1,300	800	-	800	1,300	1,690	1,300	1,690	1,300	1,690	-	-	1,300	1,690
16		Mobile Command Centers	Field mobile command centers assist in fighting active fires so they can be suppressed and controlled quickly	B	-	-	-	-	-	-	-	500	650	500	650	500	650	-	-	500	650
17		Utility Wildfire Prevention Teams (Capstone)	Teams follow electric line crews at heightened fire risk times to ensure active line work does not cause fires	B	-	-	1,897	2,546	2,067	-	2,067	2,170	2,821	2,170	2,821	2,170	2,821	-	-	2,170	2,821
18		Fire Brigade (Capstone)	Fight substation and structure fire using typical fire control facilities and fire suppression foam trailers	B	1,349	1,354	563	-	400	-	400	482	627	482	627	482	627	-	-	482	627
19		Community Outreach Programs	Work with fire agencies and other community outreach groups for fire awareness, preparation, control and public education to reduce fire risk	B	100	100	100	100	100	-	100	75	98	75	98	75	98	-	-	75	98
20		Field Patrols	Crew required when circuit is de-energized to visually confirm the continuity of the circuit before it is re-energized for safety	B	55	55	55	55	55	-	55	55	72	55	72	55	72	-	-	55	72
21		Coordination with Communications Infrastructure Providers (CIP)	Telecommunications Equipment Attachment Management System (TEAMS) program to communicate/coordinate with CIP providers to clear CIP facilities safety issues attached to SDG&E poles	B	20	20	20	20	20	-	20	20	26	20	26	20	26	-	-	20	26
22	Rapid Response Subtotal				1,539	3,181	5,885	5,840	5,660	-	5,660	6,352	8,259	6,352	8,259	6,352	8,259	-	-	6,352	8,259
23	Monitoring and Detection	Weather Stations	Maintenance and/or replacement of weather equipment and web-based forecasting system behind the FPI	B	-	-	-	-	-	-	-	425	553	425	553	425	553	-	-	425	553
24		Weather Forecasting Models	Maintain, replace, recalibrate and check over 170 weather stations within service territory. Regular upgrade of computer hardware and processors to run data analytics	B	-	-	80	100	118	-	118	118	153	118	153	118	153	-	-	118	153
25		Santa Ana Wildfire Threat Index (SAWTI)	Maintain and upgrade SAWTI, which establishes data sharing between internal meteorologists and fire agencies	B	-	-	-	-	-	-	-	20	26	20	26	20	26	-	-	20	26
26		Weather Awareness System	Maintain and upgrade communication tool that allows for real time weather information to support system operations	B	-	-	50	60	90	-	90	60	78	66	86	73	95	-	-	73	95
27		Wildfire Risk Reduction Model (WRRM)	Licensing agreement payments and enhancements to make model more usable and for ease of navigation	B	-	-	-	123	212	-	212	50	65	55	72	61	79	-	-	61	79
28		Fire Prevention Index (FPI) Components	The FPI contains inputs that need regular updating and awareness on information such as the greenness of grass layer and fuel moisture	B	-	-	31	31	31	-	31	31	40	31	40	31	40	-	-	31	40
29		NICS/Scout	Web-based situational tool	P							-	10	13	10	13	10	13	-	-	10	13
30		Partnership with Fuego/Fireball	Fire imagine equipment that would provide near real-time fire perimeter data	P							-	900	1,170	900	1,170	900	1,170	-	-	900	1,170
31	Monitoring and Detection Subtotal				-	-	161	314	451	-	451	1,614	2,098	1,625	2,113	1,638	2,129	-	-	1,638	2,129
32	TOTAL				\$ 23,305	\$ 27,114	\$ 29,728	\$ 31,688	\$ 29,768	\$ 823	\$ 30,591	\$ 32,541	\$ 42,306	\$ 32,502	\$ 42,256	\$ 32,490	\$ 42,240	\$ 878	\$ 1,142	\$ 33,368	\$ 43,382

Notes:

- Baseline (B) and Proposed (P).
- Numbers in risk chapter tables may differ due to rounding.
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<sup>1</sup> Controls/Mitigations for which numbers in risk chapter tables may differ due to calculation errors.

2016 Risk Assessment Mitigation Phase  
SDGE-01-WP  
Risk: Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) (GRC Total - Capital)

Line No.	Mitigation	Project/Program	Project/Program Description	Recorded (Directs, 2015 \$000)								Non-GRC 2015	Capital Total 2015	Forecast Range (Directs, 2015 \$000)						GRC 2017-2019 Low (Sum)	GRC 2017-2019 High (Sum)	Non-GRC 2017-2019 Low	Non-GRC 2017-2019 High	Capital Total 2017-2019 Low	Capital Total 2017-2019 High
				Status	GRC 2011	GRC 2012	GRC 2013	GRC 2014	GRC 2015	GRC 2017 Low	GRC 2017 High			GRC 2018 Low	GRC 2018 High	GRC 2019 Low	GRC 2019 High								
1	Inspection, Repair, Maintenance & Replacement Programs <sup>1</sup>	Quality Assurance/Quality Control (QA/QC) Program	Annually inspect 1/3 of the facilities within the HRFA and repair potential sources of ignition before fire season	B	\$ -	\$ -	\$ -	\$ -	\$ 920	\$ -	\$ 920	\$ 920	\$ 1,196	\$ 920	\$ 1,196	\$ 920	\$ 1,196	\$ 2,760	\$ 3,588	\$ -	\$ -	\$ 2,760	3,588		
2		Wood to Steel Program - Transmission	Replace transmission poles in higher wind prone areas	B	-	-	-	-	-	296	296	-	-	-	-	-	-	-	-	30,326	39,424	30,326	39,424		
3		Wood to Steel Program - Major Projects Transmission	Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability	B	-	-	-	-	-	-	26,264	26,264	-	-	-	-	-	-	-	136,165	177,015	136,165	177,015		
4		Wood to Steel Program - Major Projects Distribution	Replace wood infrastructure with steel infrastructure within established fire threat zones to increase fire safety and service reliability	B	332	109	105	4,564	4,046	-	4,046	1,265	1,645	5,568	7,238	5,185	6,741	12,018	15,624	-	-	12,018	15,624		
5		Tie Line Assessments	SDG&E performs Transmission Line Assessments for every transmission line in the HRFA on a three year cycle. Assessments includes review of clearances for 69kV phase to phase, 69kV to 12kV, phase to communication, phase to ground, and other issues (e.g. leaning poles, insulator swing). The three year cycle will requires review of 1/3 of the HRFA transmission lines every year	B	-	-	-	-	-	659	659	-	-	-	-	-	-	-	-	360	468	360	468		
6		Fire Risk Mitigation (FIRM)	Examine distribution circuits in the backcountry and develop projects to harden the system based on known conditions	B	725	1,166	6,646	17,032	51,688	-	51,688	91,000	118,300	91,000	118,300	91,000	118,300	273,000	354,900	-	-	273,000	354,900		
7		Corrective Maintenance Program	GO 165 mandated program: inspect underground connectors by infrared technology per ESP 120 (upon entry of facility) and replace accordingly	B	10,208	10,492	8,991	9,750	11,677	-	11,677	10,224	13,291	10,224	13,291	10,224	13,291	30,672	39,873	-	-	30,672	39,873		
8		Cleveland National Forest (CNF) - Transmission BC 8165	Consolidating over 70 individual Special Use Permits for existing electric facilities on National Forest lands into one Master Special Use Permit and fire hardening (wood to steel pole replacement and undergrounding) of 5 transmission and 7 distribution lines	B	-	-	-	-	-	5,578	5,578	-	-	-	-	-	-	-	-	222,314	289,009	222,314	289,009		
9		CNF - Distribution	Consolidating over 70 individual Special Use Permits for existing electric facilities on National Forest lands into one Master Special Use Permit and fire hardening (wood to steel pole replacement and undergrounding) of 5 transmission and 7 distribution lines	B	208	339	315	198	956	-	956	47,812	62,156	63,704	82,815	66,949	87,034	178,465	232,005	-	-	178,465	232,005		
10		FIRM/Wire Mitigation Program	Focusing on both feeder and branch lines within the Fire Threat Zone (FTZ), replace existing hardware. Replace small copper conductor with stronger new aluminum conductor	P	-	-	-	-	-	-	-	3,000	3,900	3,000	3,900	3,000	3,900	9,000	11,700	-	-	9,000	11,700		
11	Inspection, Repair, Maintenance & Replacement Programs Subtotal				11,473	12,106	16,057	31,544	69,287	32,797	102,084	154,221	200,488	174,416	226,740	177,278	230,462	505,915	657,690	389,165	505,916	895,080	1,163,606		
12	Design and Engineering Approaches <sup>2</sup>	Advanced Protection Systems - Distribution	Reclosers coupled with SCADA resources provide operations with real-time capacity to shut off portions of circuits for safety-related reasons caused by weather	B	235	9,231	7,465	3,241	1,747	-	1,747	10,675	13,878	10,675	13,878	10,675	13,878	32,025	41,634	-	-	32,025	41,634		
13		Advanced Protection Systems - Transmission	Reclosers coupled with SCADA resources provide operations with real-time capacity to shut off portions of circuits for safety-related reasons caused by weather	B	-	-	-	-	-	2,091	2,091	-	-	-	-	-	-	-	-	4,119	5,355	4,119	5,355		
14	Design & Engineering Approaches Subtotal				235	9,231	7,465	3,241	1,747	2,091	3,838	10,675	13,878	10,675	13,878	10,675	13,878	32,025	41,634	4,119	5,355	36,144	46,989		



2016 Risk Assessment Mitigation Phase  
SDGE-01-WP  
Risk: Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) (GRC Total - Capital)

Line No.	Mitigation	Project/Program	Project/Program Description	Status	Recorded (Directs, 2015 \$000)					Non-GRC 2015	Capital Total 2015	Forecast Range (Directs, 2015 \$000)											
					GRC 2011	GRC 2012	GRC 2013	GRC 2014	GRC 2015			GRC 2017 Low	GRC 2017 High	GRC 2018 Low	GRC 2018 High	GRC 2019 Low	GRC 2019 High	GRC 2017-2019 Low (Sum)	GRC 2017-2019 High (Sum)	Non-GRC 2017-2019 Low	Non-GRC 2017-2019 High	Capital Total 2017-2019 Low	Capital Total 2017-2019 High
15	Legal and Regulatory <sup>1</sup>	Marker Balls and Avian Protection Equipment	Marker balls are a visual warning to prevent aircrafts from contacting electric facilities. Avian protection covers-up electric facilities so that large birds are not electrocuted	B	-	-	-	-	-	602	602	-	-	-	-	-	-	-	-	1,272	1,653	1,272	1,653
16	Legal and Regulatory Subtotal				-	-	-	-	-	602	602	-	-	-	-	-	-	-	-	1,272	1,653	1,272	1,653
17	Monitoring and Detection	Weather Stations	Maintenance and/or replacement of weather equipment and web-based forecasting system behind the FPI	B	-	729	686	386	465	-	465	200	260	200	260	200	260	600	780	-	-	600	780
18		Weather Forecasting Models	Maintain, replace, recalibrate and check over 170 weather stations within service territory. Regular upgrade of computer hardware and processors to run data analytics	B	-	270	124	-	369	-	369	-	-	-	-	750	975	750	975	-	-	750	975
19		Santa Ana Wildfire Threat Index (SAWTI)	Maintain and upgrade SAWTI, which establishes data sharing between internal meteorologists and fire agencies	B	-	350	350	350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Monitoring and Detection Subtotal				-	1,349	1,160	736	834	-	834	200	260	200	260	950	1,235	1,350	1,755	-	-	1,350	1,755
21	TOTAL				\$ 11,708	\$ 22,686	\$ 24,682	\$ 35,521	\$ 71,868	\$ 35,490	\$ 107,358	\$ 165,096	\$ 214,626	\$ 185,291	\$ 240,878	\$ 188,903	\$ 245,575	\$ 539,290	\$ 701,079	\$ 394,556	\$ 512,924	\$ 933,846	\$ 1,214,003

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.

<sup>1</sup> Controls/Mitigations for which numbers in risk chapter tables may differ due to calculation errors.