

# Circuit Reliability Review Mono District 3

January 2017

# Providing Safe, Reliable, and Affordable Power

Southern California Edison is modernizing the power grid to meet the changing needs and expectations of our customers and to help California achieve its clean energy goals.

We are investing more than \$12 billion into our power grid between 2015 – 2017 with the goal of increasing power reliability through significant upgrades. These investments include:

- Updating thousands of transmission and distribution poles
- Replacing hundreds of miles of underground cables
- Replacing hundreds of underground structures such as vaults and manholes
- Upgrading critical distribution equipment; capacitor banks, switches, and circuit breakers
- Building new distribution circuits to serve electrical demands in our communities
- Inspecting and replacing overhead conductor and equipment to improve public safety

Our investments in local communities will help ensure that customers receive safe, reliable, and affordable electricity now and in the future.

# **Understanding Your Reliability Report**

As your electric utility, we want you to always have power when you need it. To get there, we constantly track and monitor electric outages across our service territory, and we measure our "system reliability" from this data.

The two metrics we rely on are common in the electric utility industry: the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI). Both are described in more detail on the next page.

Replacing and upgrading our infrastructure will help SCE maintain or improve SAIDI and SAIFI measurements.

This report provides historical reliability data for the circuits that serve your jurisdiction and our proposed infrastructure upgrades for the current year.

To view other reliability reports, visit <a href="sce.com">sce.com</a>>Outage Center>Maintaining Reliable Service

# Reliability Metrics

**MOMENTARY OUTAGES:** 

**OUTAGES LASTING 5 MINUTES OR LESS** 

#### MAIFI:

 The number of times the average customer is interrupted by Momentary outages each year.

#### **SUSTAINED OUTAGES:**

**OUTAGES LASTING LONGER THAN 5 MINUTES** 

#### SAIFI:

 The number of times the average customer is interrupted by Sustained outages each year.

#### SAIDI:

 The cumulative amount of time the average customer is interrupted by Sustained outages each year.

# Cities in the Bishop/Mammoth District

Big Pine

Bishop

Darwin

Dixon Lane-Meadow Creek

Keeler

#### **Mono County**

Mammoth Lakes

Mesa

**Round Valley** 

West Bishop

Wilkerson

### Reliability by SCE District (No Exclusions)

		20	12			20:	13			20	14			20	15		2016				
	District	SAIDI	District	SAIFI																	
District Name	SAIDI	RANKING	SAIFI	Ranking																	
ANTELOPE VALLEY	78.60	28	0.56	31	94.42	22	0.62	31	51.05	35	0.59	34	104.34	22	0.68	30	107.67	24	0.87	29	
ARROWHEAD	129.58	13	1.31	7	180.59	7	1.39	8	193.25	5	1.59	5	362.61	4	3.97	1	659.46	3	2.85	5	
BARSTOW	184.80	7	1.15	12	204.33	6	1.40	7	201.53	4	1.34	10	187.11	8	1.17	12	134.83	18	1.35	9	
BIG CREEK	1184.25	1	4.52	1	176.51	8	3.08	1	920.25	1	1.34	11	422.77	2	3.42	2	1062.01	2	4.99	1	
BISHOP	463.09	2	1.25	9	104.44	17	0.51	35	118.79	17	0.59	35	298.11	6	2.22	4	168.59	8	1.22	14	
BLYTHE	225.88	6	1.53	3	483.13	1	1.38	9	707.54	2	2.42	2	427.00	1	1.52	7	396.38	5	2.71	6	
CATALINA	78.46	30	0.72	29	105.94	16	2.97	2	97.02	24	4.17	1	42.56	35	2.25	3	65.01	35	3.66	3	
COVINA	108.73	19	0.92	19	100.51	19	0.86	20	91.60	27	0.87	22	100.08	23	0.81	25	112.13	22	0.97	24	
DOMINGUEZ HILLS	117.22	18	0.82	24	89.17	26	0.80	21	82.30	29	0.71	28	130.63	15	0.97	17	146.38	12	1.11	17	
FOOTHILL	91.69	25	0.90	20	85.80	27	0.79	24	93.35	25	0.93	21	109.64	20	0.95	20	142.81	14	1.03	21	
FULLERTON	68.99	33	0.42	35	90.57	25	0.79	22	82.23	30	0.72	27	76.59	29	0.67	31	92.72	30	0.76	34	
HUNTINGTON BEACH	95.78	23	0.89	21	66.51	32	0.68	29	79.61	31	0.78	25	98.32	25	0.95	19	128.02	20	1.26	12	
KERNVILLE	226.76	5	1.31	6	232.18	4	1.96	3	178.69	8	1.99	3	286.38	7	0.96	18	2421.32	1	3.67	2	
LONG BEACH	75.83	31	0.55	33	75.11	30	0.70	28	66.33	34	0.61	32	164.46	9	0.89	23	135.16	17	0.86	31	
MENIFEE	99.32	22	0.84	23	107.39	15	1.26	10	156.68	11	1.32	12	111.46	19	0.98	16	156.75	9	1.31	10	
MONROVIA	108.11	20	1.13	15	99.12	20	1.02	16	133.32	14	1.16	16	96.68	26	0.88	24	116.57	21	0.84	32	
MONTEBELLO	131.06	12	1.13	14	118.08	13	1.17	12	158.34	10	1.16	15	150.28	12	1.18	11	133.52	19	1.17	15	
ONTARIO	93.09	24	0.87	22	77.39	29	0.79	23	97.91	23	1.00	19	94.04	27	0.74	27	105.07	27	0.93	27	
PALM SPRINGS	175.92	8	1.27	8	112.80	14	0.77	25	107.04	20	0.71	29	99.54	24	0.80	26	107.58	25	1.07	19	
REDLANDS	120.13	16	1.11	16	96.48	21	1.04	15	154.25	12	1.04	18	124.52	17	1.01	14	137.11	16	0.98	23	
RIDGECREST	229.65	4	1.44	4	161.95	9	1.12	13	176.84	9	1.57	6	148.90	13	1.01	15	254.31	6	1.05	20	
SADDLEBACK	83.01	27	0.73	27	70.69	31	0.53	34	99.07	22	0.74	26	46.03	34	0.39	35	65.99	34	0.65	35	
SAN JOAQUIN	135.90	10	1.04	18	244.44	2	1.45	6	138.25	13	1.17	14	127.50	16	1.05	13	108.44	23	1.09	18	
SANTA ANA	78.60	29	0.55	32	93.35	24	0.74	26	91.68	26	0.84	23	67.46	32	0.71	29	97.27	29	1.00	22	
SANTA BARBARA	153.81	9	1.15	13	82.00	28	0.70	27	183.78	7	1.38	9	152.37	11	1.52	6	156.66	10	1.41	8	
SANTA MONICA	101.69	21	0.79	25	122.78	12	1.00	17	110.76	19	0.99	20	75.41	30	0.62	32	91.08	31	0.95	26	
SOUTH BAY	122.68	15	1.17	10	142.15	10	1.49	5	125.28	16	1.39	8	164.07	10	1.31	8	183.90	7	1.88	7	
TEHACHAPI	117.96	17	1.43	5	232.67	3	1.12	14	130.70	15	1.29	13	298.96	5	1.21	9	97.29	28	1.13	16	
THOUSAND OAKS	127.73	14	1.05	17	93.86	23	0.91	18	104.37	21	1.10	17	106.59	21	0.92	21	143.78	13	1.31	11	
VALENCIA	62.01	35	0.46	34	51.04	34	0.53	33	79.23	32	0.61	33	72.27	31	0.61	33	105.09	26	0.97	25	
VENTURA	134.81	11	1.15	11	100.52	18	1.21	11	183.79	6	1.65	4	148.85	14	1.19	10	150.41	11	1.24	13	
VICTORVILLE	67.70	34	0.66	30	61.33	33	0.63	30	68.85	33	0.63	31	87.03	28	0.91	22	79.35	33	0.92	28	
WHITTIER	72.60	32	0.74	26	135.04	11	0.86	19	87.60	28	0.70	30	114.52	18	0.73	28	137.34	15	0.81	33	
WILDOMAR	88.54	26	0.72	28	40.51	35	0.56	32	118.49	18	0.81	24	52.70	33	0.60	34	84.01	32	0.87	30	
YUCCA VALLEY	319.82	3	3.41	2	216.97	5	1.50	4	304.25	3	1.49	7	389.08	3	1.80	5	463.68	4	3.39	4	
SCE SystemWide	108.13		0.89		102.61		0.91		112.00		0.96	_	114.83		0.92		134.48		1.10		

<sup>\*&</sup>quot;Exclusions" are days which utilities are allowed to remove from their metrics because the outages on those days were caused by a severe acts of nature.

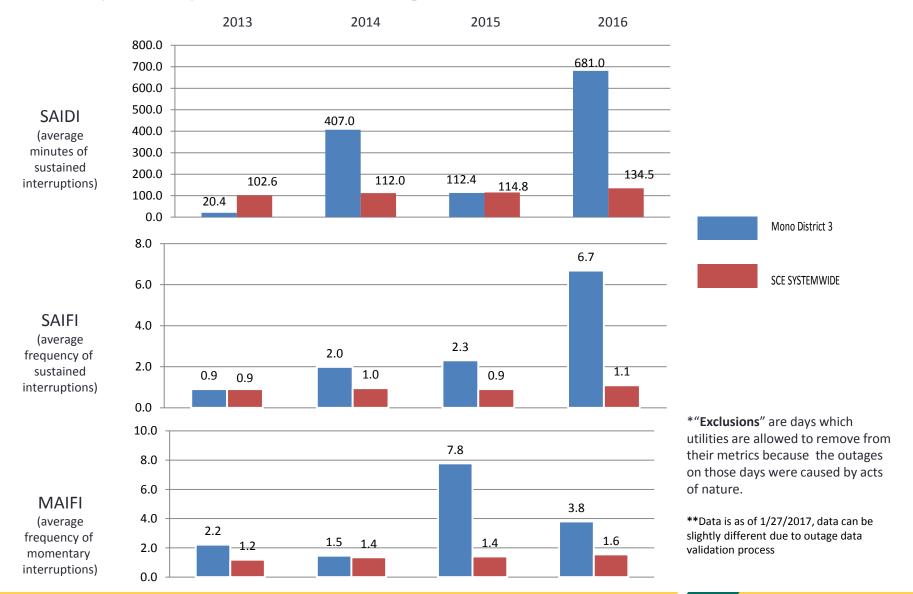
<sup>\*\*</sup>In the columns showing "Rank," lower numbers indicate poorer performance.

# Overview of Mono District 3 There are 7 circuits that serve Mono District 3

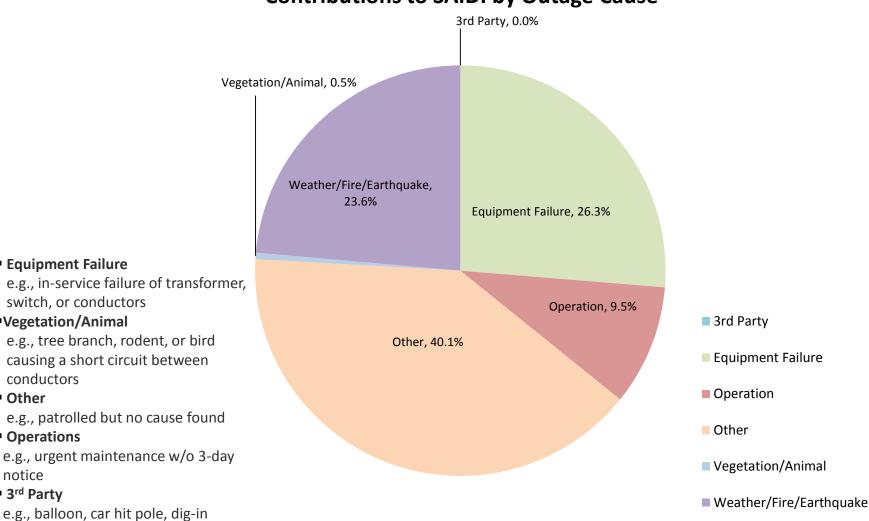
Circuit Type	Sum of Customers	Circuit Type	Sum of Customers	Circuit Type	Sum of Customers	Circuit Type	Sum of Customers
BANTA(2.4KV)	143						
CAIN RANCH(12KV)	17						
CONWAY(16KV)	26						
GULL LAKE(12KV)	377						
REVERSE PEAK(12KV)	535						
RHINEDOLLAR(12KV)	29						
TUFA(16KV)	118						

**Grand Total** 1,245

#### Reliability History of Circuits Serving Mono District 3 (No Exclusions)



#### Causes of Repair Outages in Mono District 3 Circuits **2016 YTD Contributions to SAIDI by Outage Cause**



**SAIDI** = the cumulative amount of time the average customer is interrupted by "sustained" outages each year.

Equipment Failure

■Vegetation/Animal

conductors

Operations

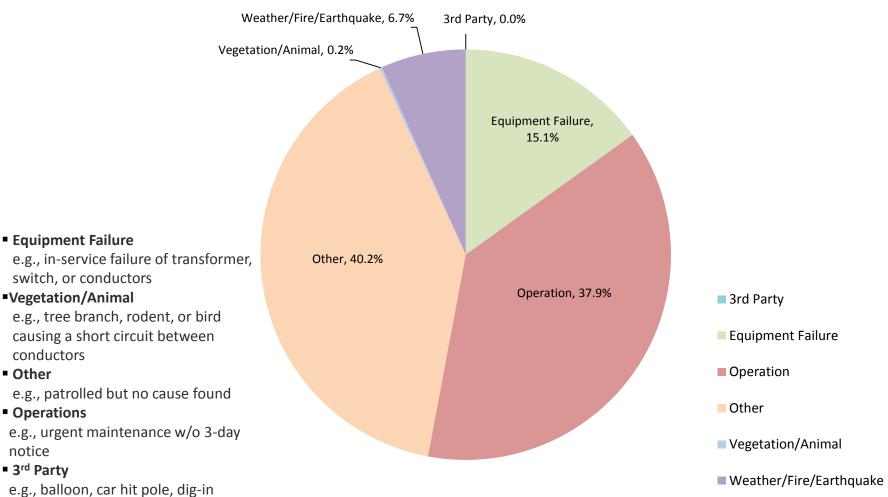
Other

notice ■ 3rd Party

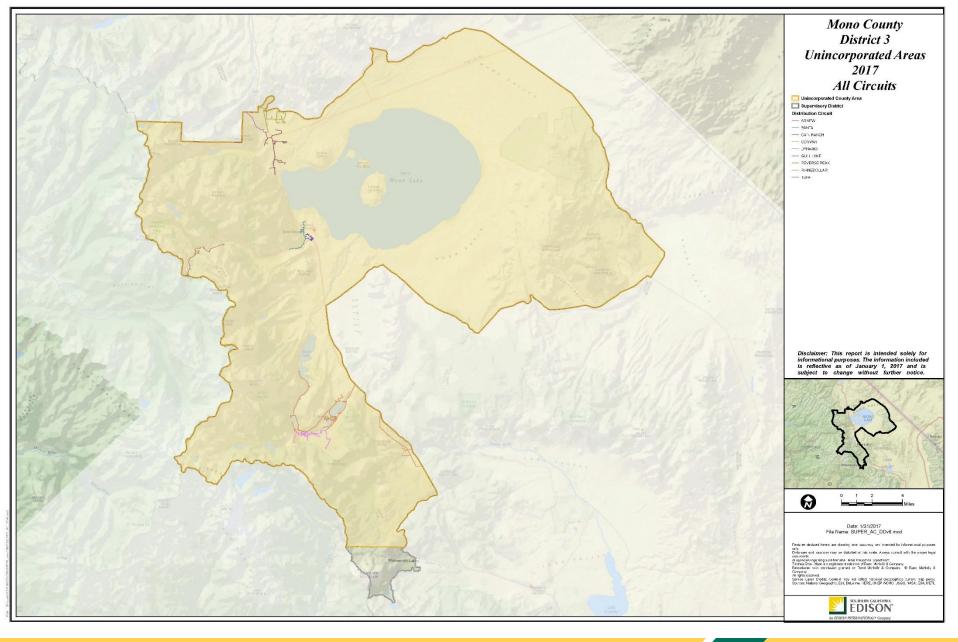
switch, or conductors

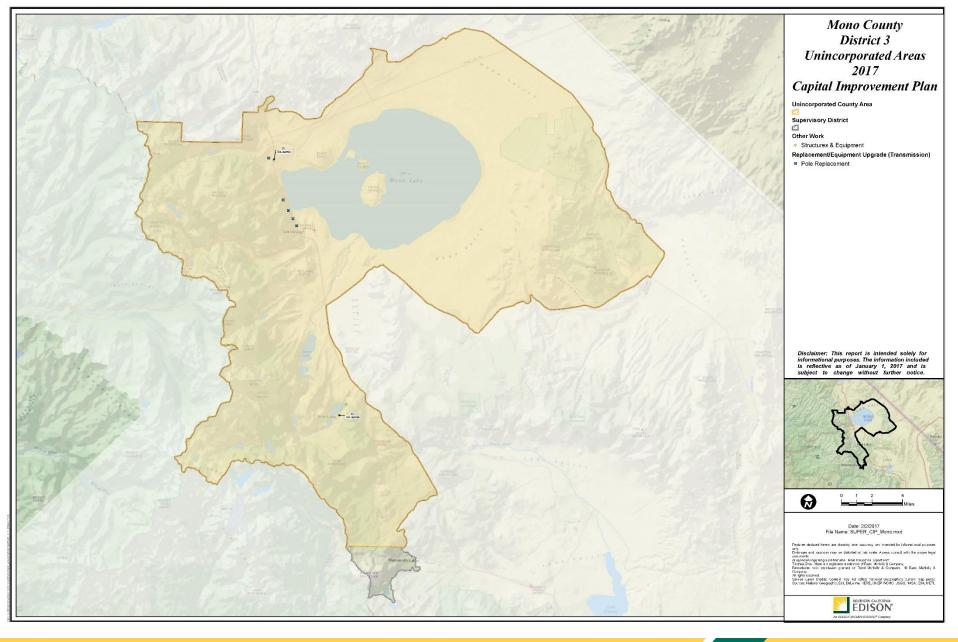
# Causes of Repair Outages in Mono District 3 Circuits 2016 YTD

#### **Contributions to SAIFI by Outage Cause**



**SAIFI** = the number of times the average customer is interrupted by "sustained" outages each year.





# **Back-up Slides**

**Reliability Histories of Circuits Serving Mono District 3** 

**Updated through Year-End 2016** 

### **Average Reliability of 7 Circuits Serving Mono District 3**

		2013	•		2014			2015		15	Qtr 20.	16	2nd	Qtr 20	016	3rd	Qtr 20	016	4th	Qtr 20	16		2016	
	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI I	MAIFI
Mono District 3	20.4	0.9	2.2	407.0	2.0	1.5	112.4	2.3	7.8	170.4	0.5	2.0	306.8	3.2	0.5	106.9	2.4	0.7	96.9	0.5	0.5	681.0	6.7	3.8
3rd Party	34%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	22%	1%	0%	0%	0%	6%	3%	1%	0%	5%	2%	0%	55%	31%	0%	0%	0%	0%	2%	2%	0%	26%	15%	0%
Operation	23%	43%	34%	46%	7%	0%	45%	38%	13%	1%	9%	25%	4%	31%	0%	12%	53%	100%	38%	41%	19%	10%	38%	36%
Other	21%	44%	66%	14%	71%	85%	20%	61%	87%	4%	6%	71%	41%	38%	100%	85%	47%	0%	51%	54%	79%	40%	40%	62%
Vegetation/Animal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	1%	0%	0%
Weather/Fire/Earthquake	0%	0%	0%	40%	22%	9%	33%	1%	0%	89%	83%	3%	0%	0%	0%	0%	0%	0%	8%	4%	3%	24%	7%	2%
SCE Systemwide	102.6	0.9	1.2	112.0	1.0	1.4	114.8	0.9	1.4	40.5	0.3	0.4	34.8	0.3	0.4	29.4	0.2	0.3	29.8	0.3	0.4	134.5	1.1	1.6

#### Notes:

No outages are excluded from the metrics.

#### **Outage Causes:**

Other: e.g., patrolled but no cause could be found

Operations: e.g., urgent maintenance w/o 3-day notice to customers

3rd Party: e.g., balloons, car hit pole, dig-in

Vegetation/Animal: e.g., tree branch, rodent, or bird causing short circuit across conductors

SAIDI (minutes) = the cumulative amount of time the average customer is interrupted by "sustained" (longer than 5 minutes) outages.

SAIFI (interruptions) = the number of times the average customer is interrupted by "sustained" outages.

MAIFI (interruptions) = the number of times the average customer is interrupted by "momentary" (lasting 5 minutes or less) outages.

### **Reliability Histories for Individual Circuits Serving Mono District 3**

		2013		2014			2015			1st	Qtr 201	16	2nd Qtr 2016			3rd Qtr 2016			4th	Qtr 20	16	2016		
	SAIDI SAIFI MAIFI		SAIDI	SAIDI SAIFI MAIFI		SAIDI SAIFI MAIFI		MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI SAIFI MAIFI			SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	
BANTA(2.4KV) - Customers: 143	64.1	1.0	5.0	20.3	2.0	1.9	16.6	1.0	10.9	0.0	0.0	3.9	21.8	2.0	1.0	97.6	3.0	0.0	61.3	1.0	1.0	180.7	6.0	6.0
3rd Party	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	0%	0%	0%	0%	0%	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Operation	0%	0%	20%	0%	0%	0%	0%	0%	9%	0%	0%	0%	55%	50%	0%	15%	67%	0%	0%	0%	0%	15%	50%	0%
Other	0%	0%	80%	100%	100%	100%	97%	99%	91%	0%	0%	100%	45%	50%	100%	85%	33%	0%	100%	100%	100%	85%	50%	100%
Vegetation/Animal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weather/Fire/Earthquake	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CAIN RANCH(12KV) - Customers: 17	120.0	2.0	6.0	19.9	2.0	2.1	275.1	3.0	15.0	0.0	0.0	4.0	21.8	2.0	1.0	96.0	3.0	0.0	63.6	1.1	1.1	181.4	6.0	6.0
3rd Party	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	0%	0%	0%	0%	0%	0%	83%	33%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Operation	0%	0%	17%	0%	0%	0%	12%	33%	7%	0%	0%	0%	55%	50%	0%	15%	67%	0%	0%	0%	0%	15%	49%	0%
Other	100%	100%	83%	100%	100%	100%	6%	33%	73%	0%	0%	100%	45%	50%	100%	85%	33%	0%	100%	100%	100%	85%	51%	100%
Vegetation/Animal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weather/Fire/Earthquake	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CONWAY(16KV) - Customers: 26	167.8	0.7	5.0	110.3	2.3	2.3	1806.4	2.0	13.3	347.5	1.3	3.0	544.2	5.0	3.0	232.0	4.0	0.0	302.5	1.3	1.0	1426.1	11.7	7.0
3rd Party	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	98%	47%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Operation	0%	0%	20%	0%	0%	0%	0%	0%	8%	0%	0%	0%	2%	20%	0%	6%	50%	0%	0%	0%	0%	2%	26%	0%
Other	2%	53%	80%	18%	86%	100%	1%	50%	92%	100%	100%	100%	98%	80%	100%	94%	50%	0%	20%	74%	100%	81%	71%	100%
Vegetation/Animal	0%	0%	0%	82%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weather/Fire/Earthquake	0%	0%	0%	0%	0%	0%	99%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	80%	26%	0%	17%	3%	0%
GULL LAKE(12KV) - Customers: 377	0.0	0.0	2.0	9.0	1.0	0.0	50.6	2.0	5.0	7.0	0.2	2.7	337.5	3.8	0.0	84.1	1.0	2.0	0.0	0.0	0.0	428.6	5.0	4.7
3rd Party	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	93%	48%	0%	0%	0%	0%	0%	0%	0%	74%	37%	0%
Operation	0%	0%	50%	0%	0%	0%	62%	50%	20%	100%	100%	63%	4%	26%	0%	0%	0%	100%	0%	0%	0%	4%	23%	79%
Other	0%	0%	50%	100%	100%	0%	38%	50%	80%	0%	0%	37%	3%	26%	0%	87%	97%	0%	0%	0%	0%	19%	40%	21%
Vegetation/Animal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	3%	0%	0%	0%	0%	3%	1%	0%
Weather/Fire/Earthquake	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

## Reliability Histories for Individual Circuits Serving Mono District 3

		2013		. 1	2014			2015		1st	Qtr 201	.6	2nd	<b>Qtr 20</b>	16	3rd (	Qtr 201	6	4th	<b>Qtr 20</b> :	16		2016	
	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI I	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIF
REVERSE PEAK(12KV) - Customers: 535	14.1	1.7	0.6	907.0	2.6	1.9	119.8	3.1	6.7	355.1	1.0	0.4	202.3	3.0	0.0	92.7	2.7	0.3	96.0	0.6	0.5	746.1	7.3	1.3
3rd Party	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	83%	33%	0%	0%	0%	0%	3%	3%	0%	23%	14%	0%
Operation	42%	50%	74%	47%	12%	0%	77%	41%	15%	0%	0%	0%	8%	33%	0%	21%	63%	100%	89%	91%	44%	16%	44%	43%
Other	42%	50%	26%	12%	51%	85%	23%	59%	85%	0%	0%	65%	10%	33%	0%	79%	37%	0%	0%	0%	49%	12%	28%	43%
Vegetation/Animal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weather/Fire/Earthquake	0%	0%	0%	41%	37%	15%	0%	0%	0%	100%	100%	35%	0%	0%	0%	0%	0%	0%	8%	6%	6%	49%	14%	14%
RHINEDOLLAR(12KV) - Customers: 29	83.3	1.0	7.0	20.0	2.0	3.0	22.5	2.0	9.6	0.0	0.0	3.7	125.6	2.1	1.0	101.5	3.1	0.0	1510.9	2.0	3.0	1738.0	7.3	7.8
3rd Party	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Operation	100%	100%	14%	0%	0%	0%	0%	0%	10%	0%	0%	0%	10%	50%	0%	15%	67%	0%	0%	0%	0%	2%	43%	0%
Other	0%	0%	86%	100%	100%	100%	100%	100%	90%	0%	0%	100%	90%	50%	100%	85%	33%	0%	100%	100%	100%	98%	57%	100%
Vegetation/Animal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weather/Fire/Earthquake	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
TUFA(16KV) - Customers: 118	0.0	0.0	5.0	26.3	2.0	3.0	17.5	1.0	15.0	89.8	0.1	4.0	1053.6	3.9	3.0	230.3	4.0	0.0	70.5	1.0	1.0	1444.1	9.0	8.0
3rd Party	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	0%	0%	0%	24%	1%	33%	0%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	15%	2%	0%	7%	1%	0%
Operation	0%	0%	20%	0%	0%	0%	0%	0%	7%	0%	0%	0%	1%	26%	0%	7%	50%	0%	0%	0%	0%	2%	33%	0%
Other	0%	0%	80%	76%	99%	67%	100%	100%	93%	0%	0%	100%	99%	74%	100%	93%	50%	0%	85%	98%	100%	91%	66%	100%
Vegetation/Animal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weather/Fire/Earthquake	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%