Presentation Agenda

- Outage Types
- Major Events
- Reliability Indices
- Monthly Report
Outage Types

- **Momentary**
  - One or more power interruptions that are 5 minutes or less

- **Unplanned**
  - Unintentional loss of power to customers

- **Planned**
  - If an outage can be deferred, it is “planned”

- **Major Event**
  - “(A)n event that exceeds reasonable design and or operational limits of the electric power system.”
Major Events

One Large Event
- Many Meters
- Long Duration

Many Events, One Day
- Heavy Winds
- Various Feeders

Extreme Type of Event
- Flood
- Wildfire
- Zombie Apocalypse
Reliability Indices

System Average Interruption Duration Index
- Average duration of an unplanned outage on the system
- The Index is given in “minutes-per-year”

Customer Average Interruption Duration Index
- Average restoration time for an interrupted customer
- The Index is given in “minutes-per-year”

Momentary Average Interruption Frequency Index
- How often momentary outages occur on average
- The Index is given in “momentary-outages-per-year”
Service Territory SAIDI Example

For the system, SAIDI of this event is 0.24

100 customers out of service

100,000 customers in service territory

4-hour unplanned outage (240 minutes)
4-hour unplanned outage (240 minutes)

100 customers out of service

1,000 customers on affected feeder

For the feeder, SAIDI of this event is 24

Single Feeder SAIDI Example
“How SAIDI accumulates” Example

Three separate identical outages, same system

\[
(240 \times 100) + (240 \times 100) + (240 \times 100) = 72,000
\]

\[
72,000 / 100,000 = 0.72 = 0.24 + 0.24 + 0.24
\]
Two outages, same SAIDI

Many customers, short time

1,000 customers for 30 minutes

Annual SAIDI of system with 100K customers = 0.3

Few customers, long time

10 customers for 3000 minutes

Annual SAIDI of system with 100K customers = 0.3

10 customers for 50 hrs = 1,000 for 30 min.
Monthly Report Introduction

• Provides “at-a-glance” reliability performance
• Indicates relative performance trends
• Reports four reliability data items:
  – Monthly SAIDI trend
  – Cumulative annual SAIDI trend
  – Monthly CAIDI trend
  – Monthly MAIFI trend
Monthly SAIDI

SAIDI = \frac{\text{All minutes every customer experienced an unplanned outage}}{\text{All TID customers}} \text{ / Month}

2019/2020
Year to Date SAIDI

SAIDI = \frac{\text{All minutes every customer experienced an unplanned outage}}{\text{All TID customers}} / \text{Year}

2020 Total
46.3

Minutes

January
February
March
April
May
June
July
August
September
October
November
December

15 Yr. Avg
2020
Monthly CAIDI

CAIDI = \frac{\text{All minutes every customer experienced an unplanned outage}}{\text{All customers that experienced an unplanned outage}} / \text{Month}

Minutes

November  | December | January | February | March | April | May | June | July | August | September | October

2019/2020

WATER & POWER
Serving Central California since 1887
Monthly MAIFI

MAIFI = \frac{\text{All customers that experienced a momentary outage}}{\text{All TID customers}} \text{ per Month}

- **November**: 0.15
- **December**: 0.15
- **January**: 0.10
- **February**: 0.05
- **March**: 0.07
- **April**: 0.07
- **May**: 0.07
- **June**: 0.07
- **July**: 0.07
- **August**: 0.07
- **September**: 0.08
- **October**: 0.10

- **2019/2020**
October Outage Contributors

- Weather: 61%
- Unknown: 18%
- Third Party: 9%
- Equipment: 12%
2018/2019 Engineering Design
Line Department
Customer Workflow Management

Construction Lead Times (In Weeks)
October Crew Structure

• 4 - 5 Person Crew
• 2 – 4 Person Crew