

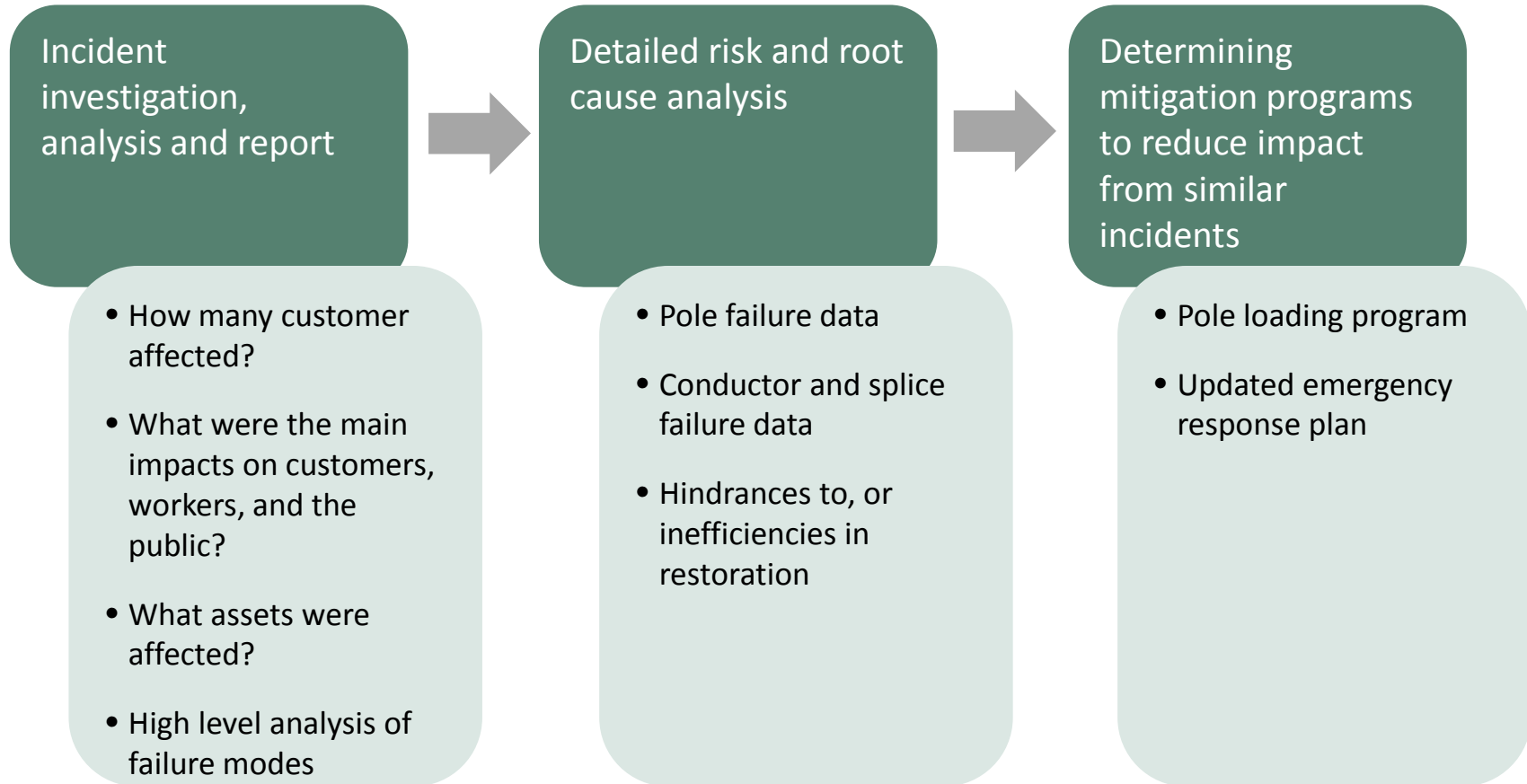


Low Frequency High Impact Incident 2011 Windstorm

Workshop 3

October 6, 2015

Data compilation and analysis associated with Low Frequency High Impact Incidents

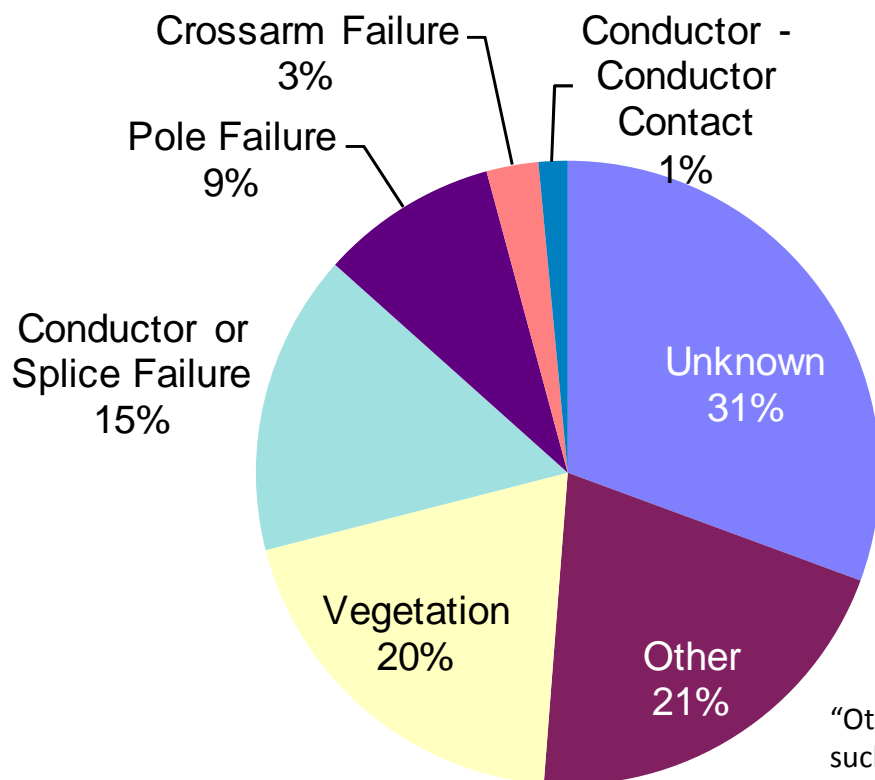


Incident Summary

Date	Nov 30 – Dec 1, 2015	
Incident Type	Windstorm with wind speeds up to approx., 100 mph	Rosenthal Report
Area Affected	<ul style="list-style-type: none"> • 26 out of 35 districts in SCE service territory • Concentrated in San Gabriel Valley (114 sq mi) 	Davies Report
Customers Affected	<ul style="list-style-type: none"> • ~440,000 across SCE service territory (~9%) • ~ 220,000 in San Gabriel Valley (~4.5%) 	SED Report
Assets Affected	Poles and wire down, CB relays	SED Report
Restoration	<p>No major safety incident</p> <p>Average outage duration 1173 minutes, Power restored to affected customers</p> <ul style="list-style-type: none"> • 47% within 24 hours • 93% within 5 days • 99% within 7 days • 100% with 7.5 days <p>1,500 line and tree resources deployed</p>	SED and Davies Report
Impact	Outages, Communication, Service restoration estimation, GO95 related issues	Various Reports

Outage Causes During Windstorm

Source: SED Report



SCE Bulletin 322 outlines procedures for restoration work during high fire threat months in high fire threat areas. The number of sustained outages due to unknown causes increased because the bulletin requires that certain reclosers stay open when a fault is detected, instead of reclosing to see if the fault had self cleared. Reclosers that operated and are subject to SCE Bulletin 322, must be patrolled by SCE personnel for safety hazards prior to being reenergized.

“Other” includes several, such as kites, balloons, yard equipment that flew into the line

Windstorm analysis and risk-informed planning

- SCE’s definition of risk events will require categorizing the findings from the 2011 Wind Storm into various risk categories per risk taxonomy.
- Data collection, risk analysis, and mitigation development have to be customized by risk category and driver

Risk Category	Event	Outcome	Impact
Asset failure	<ul style="list-style-type: none"> • Poles • Conductors / splices 	<ul style="list-style-type: none"> • Outage • Injury 	<ul style="list-style-type: none"> • Reliability • Safety
Emergency Response – Communication	<ul style="list-style-type: none"> • Medically sensitive customers • General public • Regulatory agencies • Local governmental agencies 	<ul style="list-style-type: none"> • Health and safety • Complaints and investigations 	<ul style="list-style-type: none"> • Safety • Constituent dissatisfaction*
Emergency Response - Restoration	<ul style="list-style-type: none"> • Emergency plan • Staffing level and coordination • Mutual Assistance • Data use 	<ul style="list-style-type: none"> • Longer outages • Misinformed constituents 	<ul style="list-style-type: none"> • Reliability • Constituent dissatisfaction*
Preservation of Evidence	<ul style="list-style-type: none"> • Assets and documents 	<ul style="list-style-type: none"> • Incomplete root cause analysis • Compliance 	<ul style="list-style-type: none"> • Constituent dissatisfaction* • Financial

* Impact dimension not included in SCE’s SMAP testimony

Pole Failure Risk Evaluation will include Windstorm Data

Category	Data Type	Example
Risk Evaluation	Triggered Event Frequency	# of pole failures in windstorm
	Outcomes	Outages, injuries (impact that can be directly attributed to poles during the windstorm)
	Consequence Percentage	Conditional probability of outages and injuries that can be directly attributed to pole failures during the windstorm
	Consequence Impact	Extent of outages and severity of injury related to pole failures during the windstorm
Root Cause Analysis	Drivers of Event	Pole deterioration, pole loading, wind speed exceeding design limits, vegetation
	Drivers of Outcome	Location of poles, compounding factors
Predictive Modeling	Asset attributes	For poles that failed: Remaining section modulus, Safety factor, Location (decay zone, high fire area, high wind area, # of attachments, proximity to street, residences, trees)
	Driver attributes	Frequency, severity, and location of windstorms

Challenges include isolating the impact of pole failure and understanding compounding factors because of the nature of the incident, and including potential impacts not experienced at SCE