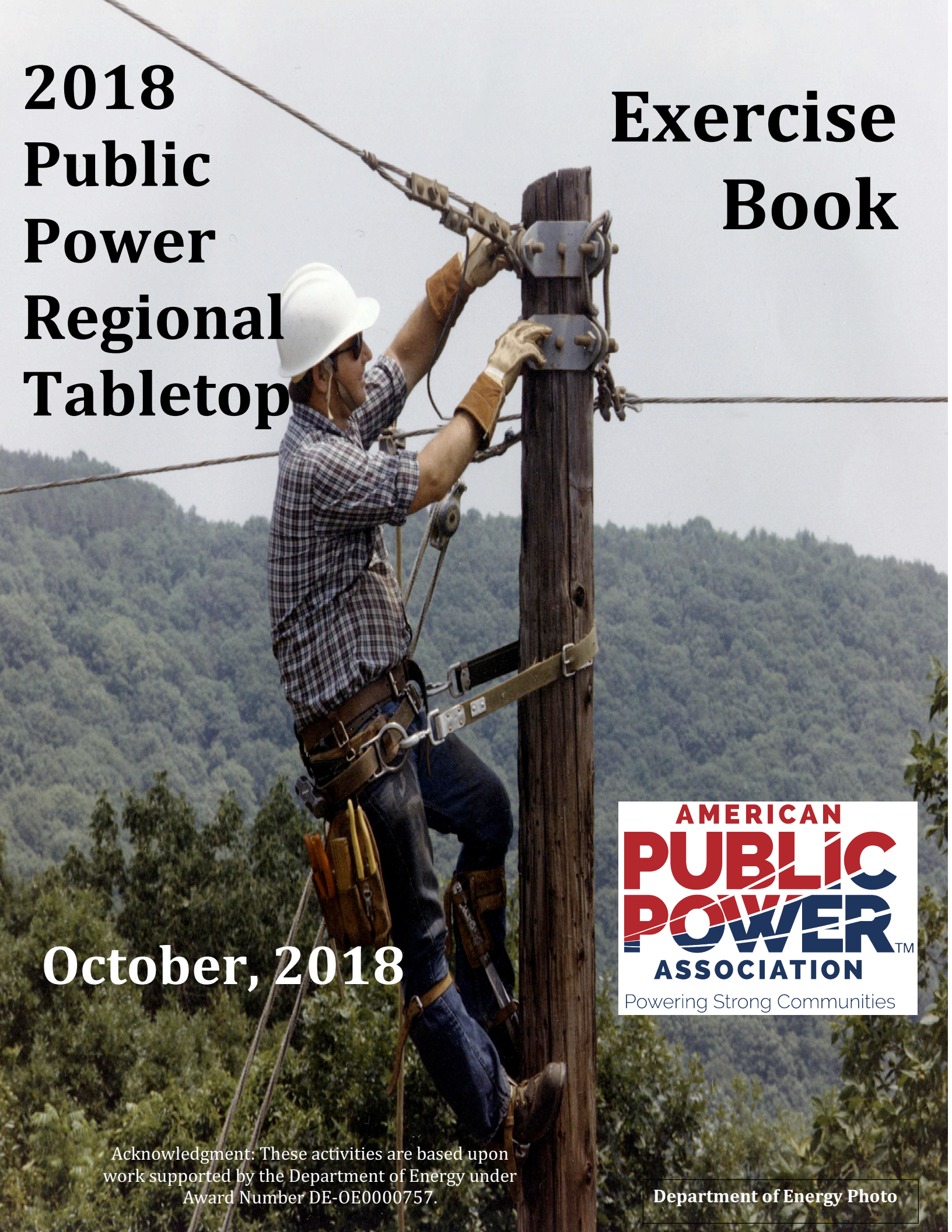
2018 Public Power Regional Tabletop Exercise Book



October, 2018

AMERICAN PUBLIC POWER ASSOCIATION
Powering Strong Communities

Acknowledgment: These activities are based upon work supported by the Department of Energy under Award Number DE-OE0000757.

Department of Energy Photo

This exercise book provides participants in the 2018 Public Power Regional Tabletop Exercise with the exercise objectives, a guide for participation, and the rules.

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The time is: 1030EST.

The phonecon was becoming routine. The Western Network Coordinators were on line with the APPA National Coordinator, CAL FIRES, USFS, and FEMA. This had been a very bad fire season. Large areas of Lassen, Plumas, and Tahoe Forests had been burned. Some of the fires had approached to within a few miles of downtown Sacramento. Fires throughout California, and parts of Washington and Oregon, had damaged transmission line and transformer facilities throughout the region. Local crews were coping, but supplies and consumables were short, and crews were getting fatigued. Fortunately, it looked like the weather was breaking. A cool, damp spell for the past two weeks was forecast to continue on into early November. Crews would have time for a rest.

As the National Coordinator finished the call the FEMA representative who had come in from the NRCC leaned over and said: "I have just two words for you: 'El Nino'. When El Nino comes it rains in California. And when it rains we get earth slides and floods. This ain't over yet." The Coordinator replied: "we'll see, how well did that La Nina work out for you last year? Wasn't very dry was it?[1]"

Once he got back to his office the Coordinator did some investigating. All of the global ensemble models were calling for heavy rainfall along the West Coast. Already sea surface temperatures in the Pacific were at record highs, and the jet stream had begun to set up in a El Nino pattern. NOAA was predicting that the Pineapple Express would be bad this year, a river of water coming right at California. FEMA might be right, California could be in for a reprise of what it saw in 2017, but this time instead of one heavy rainfall for two weeks it could be a month's long rainfall of record-breaking proportions. That would make the fires look like a rehearsal. And the fires would leave a lot of barren ground for the rains to work on. As he finished looking at the NOAA website the Coordinator looked out the window at Crystal City. It was raining.

Introduction

The 2018 Public Power Regional Exercise is designed to help better integrate local and state response to energy-related emergencies. The goal of the exercise is to give the participants, the American Public Power Association (APPA), and the Department of Energy (DOE) an opportunity to identify areas where disaster preparedness could be improved. We will do this by simulating a disaster that affects APPA member utilities in the California region. Your reaction to challenges that occur during the exercise, along with interactions with other APPA utilities, regional utilities, mutual aid providers, and emergency management personnel will

[1] In 2016-2017 California had the third wettest year on record during a La Nina event. https://www.climate.gov/news-features/blogs/enso/why-did-it-rain-so-much-california-during-last-year%E2%80%99s-la-ni%C3%B1a

contribute to everyone's understanding of the challenges, and opportunities, presented during a major electrical emergency response operation.

The APPA periodically conducts exercises for its members that allow them to learn about and rehearse emergency response processes and procedures. This exercise will expand on last year's exercise. It will involve 30-50 individuals from member utilities, both in California and outside California, mutual aid providers, and emergency management personnel. We may also simulate other concerned groups including media and local political representatives.

You will have a role within the exercise. In many cases you will have the same role you play in the real world, but you may also be asked to play that role with a California utility. You may also be asked to play a political representative, or mutual aid provider. Our goal is to both include you in an important role, as well as draw on the enormous experience you bring to the exercise.

Players and roles

Each of you will be playing a role in the exercise. Some of these roles you may be familiar with, others you may be asked to make some assumptions about. Our goal is for you to participate actively in your group's decisions, and feel comfortable in the roles that you play. If you have any challenges with your roles just ask a controller or an APPA representative.

In this section we will describe each group, and go over the essential elements of the roles within that group. The groups are:

- Public power utilities
- Federal and state emergency management
- Mutual aid providers

Public power utilities

There are five California public power utilities represented in the simulation:

- Los Angeles Department of Water and Power (LADWP)
- Modesto Irrigation District (MID)
- Sacrament Municipal Utilities District (SMUD)
- Vernon Public Utilities (VPU)
- Moreno Valley Utilities (MVU)

These utilities represent the varied geography and makeup of the California APPA membership. Each of utilities will be responsible for running its operations, both prior to the emergency event as well as during the emergency. Utilities will need to coordinate with state and federal disaster managers, determine their needs, request mutual aid, and manage their own workforce and costs.

We realize that many utilities will have an Incident Command System (ICS) structure already established for how they will respond to emergencies. If that is the case the roles shown here, leader, operations, finance, technical, should be mapped to those roles by the players working with control. If a utility does not have those functions already mapped out we recommend using the following roles:

- Utility CEO
- Operations officer (COO)
- Field commander
- Back office manager (CFO)
- Lead power engineer
- Local political leader

In a separate sheet we briefly discuss the role that each of these players will assume should you decide to use them. Again, feel free to assign roles consistent with your local practice. However, each community would, at minimum, have a local representative answerable to voters, while in most cases utility operations would also be overseen by state and local regulatory bodies. Thus, the local political perspective should remain constant regardless of how your command and control system is organized.

Federal and State Incident Management System

In addition to the utilities we also have a team representing the federal, state, and local incident management system. In this group we will have one or more players from the federal or state emergency management agencies (Federal Emergency Management Agency (FEMA) and California Office of Emergency Services (Cal OES)).

In addition, in California the State of California Emergency Plan (SEP) designates the California Natural Resources Agency (CNRA) as the Lead Agency for ESF-12 (EF-12) and the California Utilities Emergency Association (CUEA) as support for emergency operations for utilities and telecommunications. In practice this means that CUEA has the mission to manage EF/ESF-12 operations for both federal and state response in California.

This means that because the Incident Management cell represents both FEMA/CAL OES and CUEA the players will have two jobs: managing the intersection of other ESF functions with ESF-12, and coordinating the overall ESF-12 functions within the state.

At the beginning of the exercise the state is winding down its response to a severe fire season. Most fires are out, and infrastructure damaged in the fires is being repaired. The state is still under a Stafford Act declaration and elements of the National Guard are still active under title 32.

While the EOC and emergency managers would be balancing any number of response challenges during the simulation, our focus is on the power aspects of the emergency response. Players in the EOC cell should assume that normal disaster response operations are proceeding, and the focus for us is the interface between disaster response and power restoration. In other words, this is an electrical power event, not an overall disaster response exercise.

What can the state, local, and federal disaster managers are doing to assist in power restoration? For example, roads may be blocked and impassable, can earth moving equipment be diverted from other uses to open roads needed by power crews? Likewise, how does restoring power support emergency response operations? For example, instead of deploying an emergency hospital, restoring power to an existing facility might solve the need.

Note that each power utility has a political role player in their cell. They represent the local political interests, including local emergency management. Thus, the state can work with the local government in order to better understand requirements and issues affecting power restoration. And the local government can put pressure of the state and federal emergency managers to acquire more resources for the local response.

Mutual Aid Providers

As a mutual aid provider, you represent utilities not within the disaster zone who may be called on to provide for mutual aid. You will be given the mutual aid agreements you have on hand, and may modify those based on your expertise. When an emergency happens, you may be asked to provide additional support to the California utilities, and your job is to identify which equipment and personnel will go first, and which may be held behind. You can also set costs and conditions on the mutual aid. In addition, you will also represent the equipment supply pipeline: if the utilities need something that they don't already have on hand, they will need to request it from you as the "vendors."

In addition to your role as outside suppliers of mutual aid and equipment, you may also be asked to be the "jury" for complex or challenging decisions made by the power utilities. We may call on your expertise to evaluate whether a rate increase might go through, or whether a clever jury-rigged plan to restore power would actually work in the field.

Your role in the mutual aid cell will draw heavily on your expertise and knowledge of the power system and supply.

Simulation control

In addition to the player teams we describe above there is simulation control. Control consists of APPA representatives and the controllers. The main job of control is to keep the simulation going, and help you understand your role, your decisions, and the consequences of those decisions.

Control also represents any individual or organization not represented by a player in the simulation. If, for some reason, you want to talk to the Governor of California, control would represent that role (getting much needed advice from their Cal OES representatives).

Control also provides any additional information you may need that is not in your materials. If you need some additional information just ask control. We will either answer immediately ("Did the slide also take out the road? Yes.") or after consulting with other members of the control team ("Do we have additional 33kV to 92kV transformers in our Bakersfield warehouse? Let me ask a few questions and get back to you…").

It is important you not make up events in the simulation, even if you have a good estimate of what the answer might be. In the above example you might be inclined to just go with having 2 spare transformers because that is what is usually in stock. However, if you asked control the answer may be zero, due to the severe fire season that preceded the simulation and the need to replace burned up transformers. Control will work with you to think through the problem, for example "if you have zero because they were used by fire replacements, how long does it take to get a new pair? Remembering that other providers also had transformers burned up and the demand will already be large…"

Control also realizes that you have enormous expertise in this area, in fact part of the goal for this exercise is to extract and codify some of that expertise, so control will listen carefully to any counter arguments or input before making decisions in the simulation. Control is more of a partner than an adversary. In other words, we encourage you to speak up and challenge decisions, and work together with control to get the best possible answer.

Schedule

The exercise will be played in a series of "turns" or "moves" that represent a fixed amount of time. During each move you will receive updates, plan what your actions are, coordinate with other players, and tell control what you are doing. Control will use this to update the situation, and then provide additional information for the next move.

Move 1: Burned over country.

You start during move 1 at the end of the fire season, and before the rains hit. You have about 2 months to make any adjustments in your utility that you think are important. We have given you a "budget" that represents the available funds beyond what you need for day-to-day operations. You have to decide during this move how you will spend those funds, whether you will ask for additional funds either through borrowing or additional fees, and what you will do with them. This gives you a chance to prepare for any new disasters, and harden your system after taking losses during the last disaster.

Move 2: During the flood.

You are about 2 weeks into the rains. And it has rained a lot. A federal disaster has been declared, FEMA and Cal OES have a lot to do between rescuing people trapped in mudslides, to worrying about dams, to problems with contaminated water systems. They really hope they don't have to worry about power too.

In this move you will be prioritizing response operations, coordinating mutual aid, and working with the EOC to coordinate power restoration and disaster response.

Move 3: After the flood.

It has rained for 2 more weeks. Water is everywhere and evacuations have occurred. It's not the "big one" but its big enough. What is the recovery plan now that the rains have receded? How do you deal with multiple hazard challenges and systemic effects? For example, if the Internet goes down how does that affect your ability to control your substations?

Debrief

After we finish the final turn we will all gather for a debrief. Here we will get a chance to discuss what happened, share perspectives from different teams, and develop an initial set of lessons learned.

The simulation

In this section we discuss the details of each of the moves we outlined in the previous section.

Time and getting things done

Each turn represents approximately 2 weeks of exercise time, 2 hours in real time. This corresponds to the rainfall data we are borrowing from the ARkStorm scenario (see below).

Two weeks gives you enough time to move equipment, make priorities, and get things done without having to reassign resources across a longer period of time. We are not interested in the details of power restoration, assigning a bucket truck and crew to fixing lines along a particular stretch of road that has seen outages is sufficient for the turn. The key questions we will want to know are:

- Where did the crew come from?
- How did it get assigned, and how is it maintaining communications?
- Where is it bedding down?
- How is it getting consumables (food, fuel, batteries, etc.)?
- Can it navigate all of the potential hazards in its assigned area?
- How quickly will it become exhausted?

If a crew can manage multiple areas due to limited outages, then it is perfectly permissible to assign them.

Each move will begin with a briefing on the current situation from control, and end with players telling control what their key decisions were. We also have multiple materials to represent:

- The media feeds you would be getting during that period. Of course, the media stories will be heavily focused on either electrical distribution, or disasters.
- Information on areas affected by fire or weather in your area of interest.
- Operational information regarding your system and its components.

For the initial baseline we will all assemble in one group, then break out into our individual groups for discussion and decision-making. Control will also provide copies of their briefing, often with additional details, to each group. It will be important for groups to look at their individual briefings in order to fully understand what is happening in their areas.

Move 1 – Burned over country

This move will represent approximately 3 months of time between when the fires end (September) and the rains begin (December). We are not running a strict clock in the game, if something requires a specific amount of time to accomplish discuss it with control.

During this time, you have the advantage of knowing about any fire damage, and potentially allocating budget to repair it, and also having the predictions of a Pineapple Express being possible. While this isn't a lot of time, it does give you a chance to rearrange your system to better meet your goals.

In addition to worrying about natural hazards, take this time to make changes or improvements in the generation, transmission, or distribution system that you feel is required.

The way you do anything to the system is to estimate a cost, decide on how to pay for it (trade-offs with existing programs or new revenues), and then convince the politician in your group, and possibly the broader state regulators, that it is necessary. Once you have decided what you are doing, write it down and give it to a controller. Unless a written deviation from the existing plan is received by control the upgrade or change may not happen.

Moves 2 and 3 - During and After the Flood

Each of the next two moves, 2 and 3, will represent approximately 2 weeks of game time. Once again you will be given scenario materials that introduce the situation. This includes the weather, the effects of any flooding or other disasters, and the status of your operations. There will also be information for the political players.

Events will be displayed on a map of your service area showing where various events have occurred. There will also be tokens describing what the problems are. In addition, events not shown on the map or additional details will be provided in the operations briefing and in materials given to the operations manager for your utility.

Once you have oriented yourselves to the situation (briefings will be used so that you can get a handle on the situation quickly), figure out what you have, what you need, and where you might get help from. Remember that the mutual aid process, and the state and federal emergency managers, are represented in the simulation. Ask the other players in those positions for assistance, not control. Control will just direct you back to them.

Your goals during this period of the simulation are:

- Make sure your employees and facilities are not in danger.
- Assess any damage and the overall situation. This could involve dispatching crews to assess roads, facilities, or lines in order to learn what is going on (if you do this you should ask control).
- Decide what resources you have and whether those are sufficient to address the challenges. If they are not sufficient then develop a requirements list.

- Take the requirements list to mutual aid, or, if it is not related to power (i.e. you need a road opened) to FEMA. We are trying to avoid the tactical details in this simulation so you may only be told "access is restricted by floodwaters for crews in this area" as opposed to "the 301 is shut down at the overpass". FEMA and CAL OES will have to balance statewide requirements with yours.
- Some of your challenges may depend on FEMA/CAL OES and vice-versa. Coordinate with them.
- Dispatch repair crews to areas with outages, the crews will automatically do their job (unless they run out of supplies, get caught up in a situation, or don't have a place to bed down).
- Keep track of the rough costs of mutual aid and increased repairs. While we are not running a detailed budget simulation, it is useful to keep in mind that costs will increase as you respond, and eventually you may need relief from the political player on rates, borrowing, or funds.
- Keep in mind that not everything is related to the weather. Some aging infrastructure may give way anyway, and glitches or disruption may occur for other reasons.

After your team has worked through the challenges, coordinated with mutual aid, other teams, and the emergency managers, develop a basic game plan. We will ask you to tell the other players what your plan is, and in the process tell control as well. Events on the 2nd move that are not resolved during that period will spill over the 3rd move.

If left unresolved some things may simply solve themselves, but often not in a good way.

The scenario

The scenario is designed to cause significant, but not catastrophic,[2] damage to the infrastructure of your operational area. We want to give you enough of a challenge to make decisions, but we don't want to destroy California in the process.

Fires, followed by rain, is a common occurrence in California. In fact, a noteworthy fire season has occurred in each of the past two years. Last year this was followed by substantial rains which caused flooding. Highway damage last year was estimated at 1 billion dollars in California. A severe flooding event in California may be more damaging, and harder to respond to, than a major earthquake.

The scenario is loosely based on the ARkStorm study conducted in 2010 by the United States Geological Survey as part of the Multihazards Demonstration Project.

[2] Well, it really depends on what your definition of "catastrophic" is. We had to include several levee breaks and dam breaches in order to increase outages to a significant level. This is a major disaster, it's just not going to create an inland sea in the Central Valley.

The goal of that study was to design a large, historically realistic, rain event in order to examine all of the various hazards, including flooding and landslides) that would come from it. As designed the storm was a combination of the 1969 and 1986 winter storms combined into one, four-week, event. This was roughly equivalent to the Great California Flood of 1861-1862 that destroyed much of California's economy. The ARkStorm predictions are also in line with 100, 200, and 500-year flood projections from FEMA/Department of Water Resources/US Army Corps of Engineers.

Because we are only interested in electrical power, and the scale and scope of an ARkStorm event would be too large to examine in the time and space we have, we are reducing the overall effects of the event and focusing effects on areas where electrical distribution from participating members would be affected. This may mean in some cases storm effects have been increased locally, or rainfall patterns moved to affect different transmission systems being played in the simulation. This is consistent with rain patterns in California where one area may exceed 500-year rainfall totals without the entire state exceeding those totals.

In addition to ARkStorm there are also the fires that proceeded it. The fires are loosely based on the 2018 fire season currently underway, with provision to move them to areas of interest for participating members.

In addition to the storm, we also have several threads involving public messaging, power generation and system stability, and information technology ongoing in some of the systems. These are not designed as major issues, but are designed to give interplay between system operation and storm effects.

Here is some specific scenario information for each group in the game:

Los Angeles City/LADWP

Los Angeles and LADWP have a range of exposures to a flooding event. Generating stations in along the Owens River and to the north in Castaic are located along watercourses. Transmission lines run across hills and mountains prone to landslides. Substations and distribution infrastructure are near rivers and areas prone to flooding. This gives Los Angeles a wide variety of potential impacts from an ARkStorm like scenario.

The areas most likely to flood are around the coast, with the harbor area being the most likely. Other areas will also flood, but many of those areas are in SCE's jurisdiction. In addition to bulk river flooding, ponding and surface water runoff will also produce localized flooding and affect infrastructure. Because Los Angeles is not only a city, but also a transit point for many different items, disruption from flooding can have cascading effects on energy, transportation, and communications.

Sacramento/SMUD

The Central Valley is dominated by the San Joaquin river to the west, the American River, and the mountains and reservoirs to the east. Sacrament has flooded before, in 1862 the State government had to evacuate for week to San Francisco due to flooding. To protect the city a series of levees have been built up and down the river. These levees are designed to withstand substantial flood levels.

We are assuming some of the levees will break. We are using Sacramento County/City planning maps for the effects of levee breaks. We are not breaking all of the levees, but enough to cause substantial problems. At the same time, as we do for LA, we assume that a lot of rain will cause small creeks, tributaries, and drainage canals to overflow. This causes additional flooding, and headaches.

Modesto Irrigation District

You have similar problems as Sacramento, except the names of the rivers are different. In general the San Joaquin river will not cause significant flooding in Modesto the way it does to the north in Stockton and Sacramento. Instead localized flooding from the New Malones and Stanislaus Rivers will occur. Of course both of these rivers are fed by reservoirs in the mountains that are dammed, and producing hydro power. Loss of a dam could result in extensive flooding throughout the Modesto area as well as loss of the hydropower.

In addition your Ripon power plat, and the Westley substation, are located in close proximity to irrigation canals or streams. Again, small stream flooding and runoff may produce localized flooding.

Moreno Valley

Bulk flooding will not be your biggest problem except in the area adjacent to the Badlands in the east. Instead its surface water flows, ponding, and isolated stream and drainage overflows that will cause flooding in various areas of town. Flooding, and landslides, may affect SCE infrastructure which, in turn, may cause some challenges for you.

Vernon

Vernon is essentially a steel and concrete island located far above the Los Angeles river. Wind and drainage will be your problems, bulk flooding is unlikely in your city. However flooding in SCE or LADWP areas is always possible, and a lot of your transmission lines come from SCE or LADWP substations that may be vulnerable.

Attribution and sensitive information

We observe standard Chatham House Rules in the game. While you are free to use information discussed, you cannot identify the name or affiliation of the person providing the information. Thus, you will not be identified as a player, though we may report a list of the various organizations that participated in the game. We will not attribute statements or actions in the game to you, and suggest you not do the same with other players. We will be producing a final report from the game, one that discusses what was done and some of the implications.

In recent years information about electrical generation and distribution has been classified as sensitive by the Department of Homeland Security. Thus, we should avoid discussing specifics of the systems, particularly vulnerabilities. All game materials are fictional and created using only publicly available information.

Acronyms and Glossary

A-D = Analog to Digital (converter)
APPA = American Public Power Association
Cal OES = California Office of Emergency Services
CHP = California Highway Patrol
CNRA = California Natural Resources Agency
CPA = Community Planning Areas (Los Angeles)
CUEA = California Utilities Emergency Association
EF/ESF = Emergency Function (State)/Emergency Support Function (Federal)
EOC = Emergency Operations Center
FCO = Federal Coordinating Officer
FEMA = Federal Emergency Management Agency
ICS = Incident Command System
LADWP = Los Angeles Department of Power and Water
MID = Modesto Irrigation District
Mph = miles per hour
MVU = Moreno Valley Utilities
MWAG = Mutual Aid Working Group
PG&E = Pacific Gas and Electric (commercial provider)
PLC = Programable Logic Controller
NOAA = National Oceanographic and Atmospheric Administration
NRCC = National Response Coordination Center (FEMA HQ)
RTU = Remote Terminal Unit
SCADA = Supervisory Control and Data Acquisition
SCE = Southern California Edison (commercial provider)
SEP = State Emergency Plan
SMUD = Sacramento Municipal Utilities District
SST = Sea Surface Temperature
USGS = United States Geological Survey
VPU = Vernon Public Utilities