

# Assessing and Mitigating the Novel Coronavirus (COVID-19)

## A RESOURCE GUIDE

**Version 3: Updated March 30, 2020**

Planning for a health emergency, such as the novel coronavirus (or COVID-19), is unique from other business continuity planning because it requires businesses to prepare to operate with a significantly smaller workforce, a threatened supply chain, and limited support services for an extended period of time at an unknown date in the future.

The business continuity and pandemic plans developed by investor-owned electric companies, electric cooperatives, and public power utilities are designed to protect the people working for them and to ensure energy operations and infrastructure are supported properly throughout an emergency.

This document is a resource for electric power industry leaders to guide informed localized decisions in response to the COVID-19 global health emergency. It highlights data points, stakeholders, and options to consider in making decisions about operational status, while protecting the health and safety of employees, customers, and communities.

Sharing practices and expertise will allow participants to make better-informed independent, localized decisions that will help reduce the negative impacts to the country's electric power supply during the COVID-19 global pandemic. The ESCC and its members are committed to complying fully with all applicable federal and state antitrust laws. The activities of the ESCC are not intended, and do not constitute an agreement, to influence markets or prices for goods or services.

This document will evolve as public health officials and other government sources provide additional data and more is known about COVID-19.

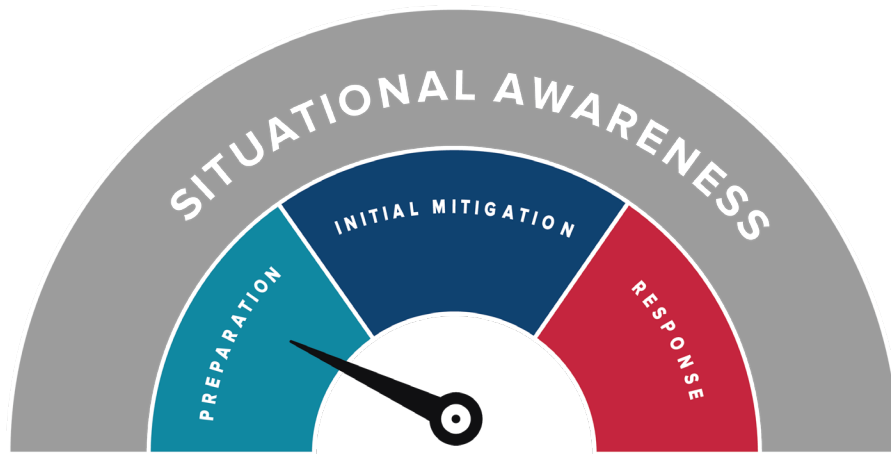
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### **Disclaimer**

*This document does not constitute legal advice. All examples and anecdotes are offered for illustrative purposes only. Recognizing circumstances differ across the industry, the intent of the document is to serve as a general resource of information and not an industry standard or establishing industry wide best practices. ESCC members are independent entities and affected by different member, financial, legal, political, policy, operational, and other considerations. Users of this document should consult with their own legal and operational experts when making any and all decisions about responses to COVID-19 and its corollary effects.*

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## Stages of COVID-19 Mitigation and Response

### Situational Awareness

Investor-owned electric companies, electric cooperatives, and public power utilities should maintain regular situational awareness of critical information that may inform preparation, mitigation, and response actions, including:

- COVID infection rates, including number of current cases and deaths impacting:
  - local communities served
  - employees or immediate family members
  - contractor or vendor operations, personnel, or immediate family members
- Public health emergency declarations in service territory
- Centers for Disease Control and Prevention (CDC) travel guidelines for service territory
- School closures, including impacts to personnel with job duties that limit telework and other flexibility options
- Key accounts posture/closures
- Contractor and vendor posture
- Access to, and availability of, testing and vaccines
- Access to health care facilities and the changes in capacity of these facilities
- Industry trends based on tracking by trade organizations (APPA, EEI, NRECA), NERC, and the E-ISAC

Investor-owned electric companies, electric cooperatives, and public power utilities should coordinate with:

- State/local elected/appointed officials and designees
- State/local health offices
- Key accounts, vendors, and contractors
- Local union and labor officials

- Federal government officials through the Electricity Subsector Coordinating Council (ESCC)

## Preparation

Assuming there are **no confirmed cases of coronavirus among employees or within the service territory**, investor-owned electric companies, electric cooperatives, and public power utilities should consider:

- Increasing hygiene measures
- Planning for all employee telework
- Planning for sequestering at critical facilities
- Assessing stockpiles of critical materials, including food, personal protective equipment (PPE), and critical equipment or materials
- Instituting foreign travel restrictions (CDC level 2 and 3 countries)
- Increasing the frequency of messaging internally (employees) and externally (community, customers, other partners)

## Initial Mitigation

If there are **no confirmed cases of coronavirus among employees, but confirmed cases within the service territory/community**, investor-owned electric companies, electric cooperatives, and public power utilities should consider:

- Increasing hygiene measures
- Instituting non-essential employee telework and continue planning for all employee telework
- Sequestering as appropriate at critical facilities
- Instituting domestic and foreign travel restrictions (CDC level 2 and 3 countries)
- Limiting attendance to large group events
- Maintaining internal/external messaging
- Planning for facility decontamination and remediation

## Response

If there are **multiple employees with confirmed coronavirus**, investor-owned electric companies, electric cooperatives, and public power utilities should consider:

- Instituting employee telework for all appropriate employees
- Sequestering at critical facilities
- Instituting domestic and foreign travel restrictions (CDC level 2 and 3 countries)
- Maintaining internal/external messaging

- Planning for facility decontamination and remediation

## General Planning Considerations

As part of their business continuity planning, investor-owned electric companies, electric cooperatives, and public power utilities should consider the following:

### Enterprise-Wide Planning

- Refreshing all business continuity plans and assessing whether the plans are robust enough to deal with workforce shortages considering loss of workers, facilities, and critical vendors and possibly technology.
- Establishing a cross-functional team to identify roles and responsibilities for stakeholder engagement and tracking of key planning indicators.
- Assessing what level of leadership should meet, and how often, to discuss recommendations and decisions.
- Identifying factors that might lead to declaring an organizational emergency, and the consequences of declaring an emergency.
- Determining who is considered an essential employee, whether employees can be required to stay at work, and what the HR/ legal considerations are.

### Work-Related Domestic and International Travel

- Determining at what point the organization:
  - Restricts international travel to, or transit through, CDC level 2 and 3 countries
  - Restricts or discourages all non-essential international travel, regardless of CDC assessment
  - Restricts or discourages non-essential domestic travel
- Determining whether the organization should require self-quarantine for travelers returning from CDC Level 2 and 3 countries, and when should the self-quarantine be enforced.
- Determining whether travel restrictions are limited to situations where any social distancing is difficult (i.e., train travel, metro travel, etc.).

### Information Technology

- Benchmarking current IT capabilities to address:
  - How many log-ons can the network support at once?
  - How many people require VPN access to perform their jobs?
  - Do employees who do not normally telework need to be issued additional equipment, such as laptops?

- Determining the plan if the organization should significantly increase network capability to support more telework and how long it would take to complete the necessary upgrades.

## Assessing Employee Health and Wellness

- Considering what testing guidelines/information can be provided to workers.
- Determining whether the organization may test potentially exposed employees prior to returning to work.
- Deciding how the organization will identify and inform potentially exposed co-workers, vendors, or contractors if an employee is confirmed to have COVID-19.
  - Will those who are potentially exposed be required to self-quarantine?
  - How will the organization inform local health officials?
- Determining what family support resources currently are in place and whether they need to be enhanced.

## Facility Management

- Identifying what the basic daily cleaning requirements are and whether the frequency of cleaning should be increased.
  - How many times a day?
  - Where should hand-sanitizer/disinfectant wipes be placed?
- Deciding when it is appropriate for the organization to cancel or restrict large group gatherings, both internally and externally, and how a large group should be defined.
- Determining when the organization limits access to, and employs protective measures for, critical facilities.
- Deciding what type of decontamination should occur if an affected employee/vendor/ contractor reports to a work location and whether the immediate area or entire facility should be shut down.
- Determining when an organization should consider implementation of employee/visitor screening at building entrances, and when visitors should be restricted from entering facilities.

## Management of Vendors/Contractors/Supply Chain Disruptions

- Determining when an organization would consider suspending in-person vendor meetings, particularly if vendors travel internationally.
- Defining what types of materials and services are critical.
- Assessing the current stockpiles of critical materials and the course of action if the stockpiles become low or are depleted.
- Identifying what plans vendors/contractors/suppliers have in place to ensure continuity of operations.

## External and Internal Messaging

- Determining what messaging would be provided to:
  - General employees/managers/supervisors
  - Affected employee(s)
  - Managers/supervisors of affected employee(s)
  - Co-workers of affected employee(s)
  - Others at work location of affected employee(s)
  - Externally affected/exposed stakeholders
  - Internal stakeholders
  - Media
- Deciding what additional information needs to be included in messaging and whether there are any additional notifications that need to be made.
- Establishing the frequency and cadence of communications and consideration of multiple modes of communications (e.g., emails, FAQs, portals, facility-specific messaging, etc.).

## Review of Grid Reliability and Mutual Assistance Networks

- Identifying whether decisions to increase/suspend/reduce operations at key accounts will impact load balancing.
- Determining whether the organization has identified facilities critical to the operation of the energy grid and has made accommodations for sequestering at those facilities (on-site food/water/hygiene/medical, family services, personal protective equipment, etc.).
  - What enhanced facility management needs to occur to make the environment as safe as possible?
- Determining whether the organization has made accommodations for line crews that may need to respond to grid disruptions (family services, PPE, etc.).
  - What type of personal protective equipment should be provided to crews operating in areas with high numbers of infections?
- Determining whether the organization is in contact with mutual assistance networks to assess the availability of additional resources if there are not enough workers to perform critical work.
  - Could the organization support a request for assistance, and has the company shared its status with the mutual assistance networks?





# COVID-19 Access Considerations

**Updated: March 30, 2020**  
**Changes since the last version are highlighted in red**

This document provides guidance that investor-owned electric and/or natural gas companies, public power utilities, and electric cooperatives may want to consider when accessing buildings or areas with COVID-19 contamination. It includes two sections:

- Guidance before entering a home/building with known or suspected COVID-19 contamination.
- Guidance to consider when attempting to access, and operate in, an entire community or region that has been restricted by a state/local government entity due to COVID-19.

The guidance in this document was collected from organizations across the industry. The intent of the content is to serve as a general resource of information and not an industry standard. This document is evergreen and will be updated regularly as additional guidance is received.

## Access to Contaminated Homes/Buildings

### Prioritizing Work in Contaminated Areas

Recognizing circumstances differ across different service territories and different communities, investor-owned electric and/or natural gas companies, public power utilities, and electric cooperatives may consider the following in prioritizing work required to be completed in a contaminated area:

- Organizations should develop a list of essential and non-essential services and discuss those with appropriate government officials (including, but not limited to, the public utility commission) for feedback and appropriate waivers, if needed.
- Natural gas utilities should discuss leak response time requirements with the public utility commission and how/if responses can be prioritized, if applicable.
- Organizations should identify essential vs. non-essential services specific for in-home/building service (most applicable to appliance servicing) to inform prioritization of work orders/requests.

## Supporting the Workforce Operating in Contaminated Areas

To support the workforce, investor-owned electric and/or natural gas companies, public power utilities, and electric cooperatives should consider the following practices to identify a contaminated home and mitigate exposure to field personnel:

- Conduct daily safety briefings prior to field workers going on service calls and develop an internal website with FAQs that are updated once a day on PPE guidance and other mitigation requirements. ([See Q&A on using a respirator.](#))
- Develop a process workflow with questions and talking points for employees to use at the customer's door to identify suspected COVID-19 concerns. The document will give employees the flexibility to gauge the situation and to employ voluntary social distancing when the response requires entering a home/building.

If a customer reports he/she has symptoms, the workflow document should include direction for the employee to call a supervisor to decide if the work is essential or non-essential. If essential, the employee follows the workflow document using upgraded PPE. ([See example of COVID-19 Workflow & Biohazard Assessment.](#))

Questions/directions to consider for a workflow document include:

- Employees ask three pre-entry questions to validate status of COVID-19 at the location:
  - Is anyone in the residence, location, or establishment self-quarantined or self-monitoring for COVID-19 within the past 14 days?
  - Has anyone in the residence, location, or establishment had a possible exposure to COVID-19 within the past 14 days?
  - Is anyone in the residence, location, or establishment sick with a respiratory illness, cough, fever, congestion, or experiencing shortness of breath?
- Employees who enter a customer location with an active case of COVID-19 should consider the following protective measures:
  - Ask that the sick person go to another room.
  - Practice social distancing (at least 6 feet) from healthy people in the location.
  - Avoid touching surfaces whenever possible.
  - Avoid touching your face, nose, mouth, or eyes.
- Allow field personnel to call a “safety stop” when they are reluctant to enter a dwelling. A field worker should call his/her supervisor and discuss essential vs. non-essential work and proper precautions to take.
- After the work is completed, refer to CDC and OSHA for proper handling and disposal of contaminated PPE. OSHA issued specific guidance on COVID-19, which can be found on-line at:

<https://www.osha.gov/Publications/OSHA3990.pdf>

- Ensure employees are aware of the COVID-19 symptoms, and provide a mechanism (e.g., confidential hotline) for personnel to contact an organization's internal/external medical provider.
- Consider the importance of providing family services' support for employees who may need to self-quarantine after potentially coming in contact with COVID-19 cases or have symptoms of an infection.

## Access/Operations in Restricted Areas

In addition to the considerations above for work within a home or building, below are additional steps for organizations to consider when accessing and maintaining operations within an entire community or region that has been restricted by a government entity due to COVID-19. **There is no one-size-fits-all approach given the number of variables, which include, but are not limited to, differences in state and local governments, community densities, regional weather conditions, and service territory nuances. For example, the community of New Rochelle, New York, had a one square mile containment zone; however, the local authorities did not restrict travel through or business in/out. Different local jurisdictions may impose different restrictions. As a result, the following guidance is intended to assist operators with advance planning for access and continuation of safe and reliable service to a restricted area.**

### Travel Into/Through Restricted Areas

- Public health quarantine and isolation statutes vary by state. A state-by-state summary of these statutes can be found online at:  
<https://www.ncsl.org/research/health/state-quarantine-and-isolation-statutes.aspx>
- Decisions to restrict access generally are made by local governments. Note, those decisions likely will be made in coordination with state officials. Enforcement of restricted access typically will be done by local law enforcement, state police, or National Guard with authority from the governor.
- While not explicitly restricting access to a community or region, state or local governments may take actions to reduce density (such as enhanced social distancing) around COVID-19 hotspots. These actions typically come in waves, for example: instituting a 1-mile or 2-mile radius; shifting from increased telework to mandatory telework; or limiting the workforce to essential-only personnel and then sequestering essential personnel.
- Organizations should engage with their state Emergency Operations Centers (EOC) on a regular basis to:
  - Obtain an authorization letter, or similar documentation, that will help facilitate transportation across the state.
  - Ensure that the EOC staff has visibility on crew movements and operational priorities.
- Organizations should use the EOC to engage local authorities to discuss:
  - How an organization will be informed of a decision to restrict access to a community or region.
  - The process that will be used to grant access to the restricted area. This process may allow cleared workers to enter and exit the restricted area at will, or it could require daily or regular screening.
- Organizations should consider issuing badges/cards **or letters** that identify employees who serve critical functions and should work with local authorities to accept such credentials to grant timely access. These additional credentials could help facilitate access to restricted areas. The credential can reference guidance released by the U.S. Department of Homeland Security to

help state and local officials determine the businesses and workers that are essential for sustaining critical infrastructure operations. That guidance can be found online at:

<https://www.cisa.gov/publication/guidance-essential-critical-infrastructure-workforce>

- Organizations should monitor restricted areas across their service territory to consider how those restrictions may impact transportation routes.
- Public health quarantine and isolation statutes vary by state. A state-by-state summary of these statutes can be found online at:

<https://www.ncsl.org/research/health/state-quarantine-and-isolation-statutes.aspx>

- Decisions to restrict access generally are made by local governments. Note, those decisions likely will be made in coordination with state officials. Enforcement of restricted access typically will be done by local law enforcement, state police, or national guard with authority from the governor.
- Organizations should engage with their state Emergency Operations Centers (EOC) on a regular basis.
  - Pursue obtaining an authorization letter, or similar documentation, that will help facilitate transportation across the state.
  - Ensure that the EOC staff has visibility on crew movements and operational priorities.
- Organizations should use the EOC to engage local authorities to discuss:
  - How an organization will be informed of a decision to restrict access to a community or region.
  - The process that will be used to grant access to the restricted area. This process may allow cleared workers to enter and exit the restricted area at will, or it could require daily or regular screening.
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<https://www.cisa.gov/publication/guidance-essential-critical-infrastructure-workforce>

- Organizations should monitor restricted areas across their service territory to consider how those restrictions may impact transportation routes.

## **Maintaining/Monitoring Staffing Levels**

- As state and local governments make decisions on restricted areas and/or containment zones, organizations should plan for how those decisions could impact the workforce and the ability to maintain business and operational continuity. Organizations should consider:
  - Geographic mapping of employee home addresses and work locations using IDs to protect worker privacy.

- Developing an understanding of the high-risk population within the workforce, while following ADA and other applicable laws and regulations.
- Including HR, legal, and labor relations in the planning process.
- Once restricted areas and/or containment zones are announced, an organization should consider:
  - Identifying and communicating with the employees who live or work in the impacted area.
  - Communicating with the full workforce to explain the impact to the organization.
  - Providing an outside medical resource for employees to call with medical questions.
- To maintain adequate staffing levels, organizations should consider:
  - Bringing recently retired or separated employees with specialized training back to the organization.
  - Training and certifying current employees for some specialized work, in coordination with labor unions.
  - Transferring employees who typically provide non-essential services into an essential service area, provided they have the proper qualifications, in coordination with labor unions.
  - Establishing a flexible staffing contingency plan to accommodate restrictions (such as age) that are imposed by government authorities on the workforce.

## **Social Distancing in the Work Environment**

- Regardless of whether a facility is in a restricted area or containment zone, organizations should consider social distancing steps to minimize exposure in the work environment: They should:
  - Minimize person-to-person contact.
  - Minimize interaction between employees.
  - Split critical employees into different shifts and/or different locations.
  - Increase the frequency and level of cleaning and disinfection in critical work areas.
- For field workers operating in a restricted area or containment zone, organizations should consider:
  - Offering alternate lodging, such as mobile homes and RVs equipped with washer/dryers, showers, and kitchens.
  - Dividing workers into small teams and keeping those teams separated with assigned vehicles and different base camp / staging area locations. Consider rental options to keep the number of workers in a single vehicle low.
  - Instituting triple wellness checks with mandatory temperature readings at arrival, at mid-shift, and when going off-duty, with a health survey.

- If an employee tests positive for COVID-19, consider:
  - Tracing the individual's steps to determine who that individual worked with in close proximity, as defined by the CDC:  
<https://www.cdc.gov/coronavirus/2019-ncov/prepare/transmission.html>
  - Notify the employees who came in contact with the individual.
  - Clean and disinfect the area where the individual works and consider options for notifying, monitoring, and potentially quarantining workers who had been in close contact as each situation dictates using CDC guidance:  
<https://www.cdc.gov/coronavirus/2019-ncov/prepare/disinfecting-building-facility.html>

## Access to Military and Federal Government Facilities

- Organizations should engage directly with military facilities and federal government buildings to determine if and when access is required.
- For visibility, the Department of Defense (DoD) has released some department-wide guidance, which can be found online at:

<https://www.defense.gov/Newsroom/Releases/Release/Article/2121122/partnering-with-the-us-defense-industrial-base-to-combat-covid-19/>

## Additional Resources

### Example Q&A for Using a Respirator for COVID-19 Mitigation

**When do I need to wear a respirator?**

A respirator (N-95 or higher-level) only should be used if you are entering a customer's premises where there is a confirmed or suspected COVID-19 case, and you cannot maintain 6 ft social distancing.

**How do I get a respirator?**

Contact your supervisor with justification to use a respirator. Your supervisor will arrange to get you a respirator after ensuring that you have been fit tested, medically cleared, and properly trained on the use of the respirator.

**Do I need Medical Clearance and Fit Testing before wearing a respirator?**

Yes, you must complete respirator medical clearance and fit testing within two years before use. Employees must be fit tested to all makes, models, and sizes of the respirator(s) to be used. Unless it has been waived by OSHA, an employee's medical condition must be evaluated before fit testing. There are different N95 respirator models that may be in use in the company – you must be fit tested for the model you will be using. (NOTE: Some safety procedures require OSHA-approved training on the use of PPE prior to entering a hazardous environment. A respirator cannot protect an employee if he/she does not know how to use it properly. Check with your company policy and follow any training requirements.)

**What types of respirators are effective against COVID-19?**

Disposable respirators (also known as N95 respirators), half-face respirators, and full-face respirators. All respirators must be NIOSH approved. Class and stock details are provided at the end of this Q&A.

**How do I use an N95 respirator correctly in a COVID-19 situation?**

Follow this N95 Respirator use guidance:

- Use hand hygiene/sanitation when donning and doffing.
- Use a pair of clean latex or nitrile gloves when donning an N95 respirator and performing a user seal check. Employees should understand that beards and other facial hair may reduce the effectiveness of a respirator substantially.
- Discard gloves after donning and making any adjustments to ensure the respirator is sitting comfortably on your face with a good seal.
- Avoid touching the inside of the respirator.
- Inspect the respirator again after cleaning.
- Contact lenses may be worn; however, the employee must have experienced success in wearing contact lenses with a respirator. Consider the environment before doing so

**Can I reuse an N95 respirator?**

Yes. You may reuse an N95 respirator. As with any respirator, inspect it before each use and ensure all components of the respirator are intact, and perform a user seal check. Reuse can be done for up to one shift, as long as the N95 was used as per above guidance. Filtering facepiece respirators can be reused by the same worker, but **only** if the respirator is working properly, its shape remains unchanged, and the filter material is not physically damaged or soiled.

**How do I store and dispose of an N95 respirator?**

A: Store respirators in a bag labeled with your name. Dispose of the storage bag after each use. Discard spent gloves, respirators, and storage bags as regular trash.

**Can I use half-face and full-face respirators instead of N95 respirators?**

Yes. If N95 respirator supplies are low, you can use half- or full-face respirators with P100 magenta cartridges, which will provide adequate protection. Follow all donning and doffing, hand hygiene, storage, and disposal procedures described above. Half- and full-face respirators may be reused if they pass the pre-use inspection.

**What cleaning instructions apply to half- and full-face respirators?**

Half- and full-face respirators must be cleaned using an approved towelette or cleaning solution after each use. Wipe down all surfaces of the respirator, including the cartridges.

**What do I do if my respirator is damaged?**

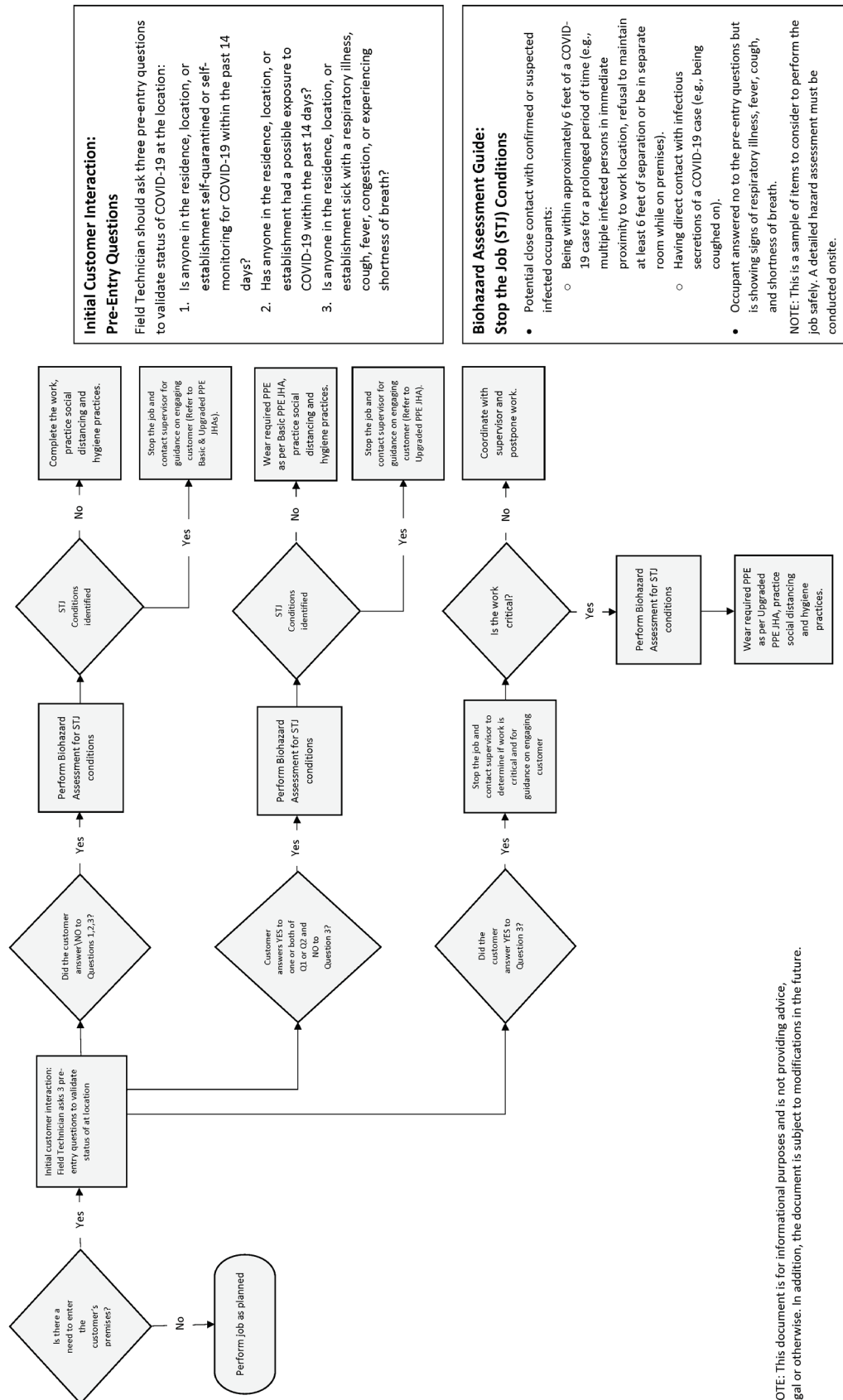
Do not use any damaged equipment. Discard all damaged respirators and components and request a new one from your supervisor.

**Additional information from OSHA respiratory protection standards can be found at:**

**<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134>**



## Example of COVID-19 Workflow & Biohazard Assessment



NOTE: This document is for informational purposes and is not providing advice, legal or otherwise. In addition, the document is subject to modifications in the future.



# Control Center Continuity

**Updated: March 30, 2020**  
**Changes since last version are highlighted in red**

This document provides guidance to investor-owned electric companies, public power utilities, electric cooperatives, and federal government-owned utilities responsible for the safe and reliable operation of transmission and distribution control centers during and throughout the COVID-19 pandemic. This document develops credible scenarios that could impact control center operations, identifies mitigation options, supports information sharing across the industry, and outlines needed government actions.

## Regulatory Relief and Governmental Support Needs

The mitigation strategies for the scenarios described below cannot be executed unless: **(1)** COVID-19 testing is available and streamlined for essential personnel who work in shift environments, i.e., control center personnel; **(2)** relief from certain regulatory obligations is obtained to ensure the continued availability of control room operators; **(3)** travel restrictions for the general public exclude personnel essential to the reliable operation of control centers; and **(4)** supplies for cleaning/hygiene are readily available.

Following is a summary of specific government actions needed to ensure successful mitigation of risk to control center continuity:

- **High-Priority Actions Needed**

- Governmental authorities should direct medical facilities to prioritize testing for asymptomatic control room operators (and treat them comparable to first responders) in advance of sequestered, extended-duration shifts. State regulatory approval should be given to corporate health services organizations to administer testing for coronavirus to essential employees, if applicable.
- If local, regional, state, or federal government authorities enforce a populace-wide quarantine/curfew or other travel restrictions, operators of critical facilities still should be able to move freely outside of hours.
- NERC should waive the certification requirement for system operating personnel if minimum staffing levels cannot be maintained. [\(This issue was addressed by FERC/NERC on 3/18/20.\)](#)

- NERC should allow the deferment of maintenance activities that require support from control center staff (e.g., contingency analysis and switching instructions). [\*\(This issue was partially addressed by FERC/NERC on 3/18/20.\)\*](#)
- **Medium-Priority Actions Needed**
  - Control center facilities should be authorized to receive a priority supply of sanitizing supplies and PPE.
  - Non-medical professionals (such as control center managers and supervisors) should be given state approval to administer health questionnaires and temperature checks **using appropriate PPE while following EEOC guidelines:**  
[https://www.eeoc.gov/facts/pandemic\\_flu.html](https://www.eeoc.gov/facts/pandemic_flu.html)
  - NERC temporarily should suspend regional entity audits of all registered entities. [\*\(This issue was partially addressed by FERC/NERC on 3/18/20.\)\*](#)

## Identifying Critical Control Center Personnel

The personnel needed to staff the control centers of electric transmission and distribution facilities, generation facilities, reliability coordinators, and balancing authorities are essential to the reliable operation of the energy grid. The facilities needed to perform these functions are generally well-isolated and physically secure, or at least conducive to the sequestration of on-site staff as needed. However, given the long lead times required to train personnel to properly utilize the Information Technology (IT) and Operations Technology (OT) tools used to maintain control center functionality and grid visibility, the limited number of people with these qualifications places a higher risk to reliable operations and requires a higher priority for protection from the spread of COVID-19 than the general population.

To categorize these personnel accurately across the electric industry, a common method for identifying essential personnel is needed. This will allow for a better understanding of the number of people involved so that effective strategies for mitigating their risk of infection and resulting removal from the workforce can be developed. Individual investor-owned electric companies, public power utilities, electric cooperatives, and federal government-owned utilities still will have discretion to identify essential personnel unique to their organization, but a more uniform approach to categorizing staff will support the communication of likely areas of government support at the local, state, and federal levels.

Specific to energy grid operation, each organization has employees who fit into two categories: Control Room Operators and Direct Support Personnel. Each of these categories can be broken down into individuals who can perform their functions remotely, and those who must be physically present at their control center workstations in order to perform their required duties. For the purpose of this analysis, only those who cannot work remotely will be prioritized for continuity of operations.

The job titles of people in each category will vary by organization, but Control Room Operators generally include reliability engineers, dispatchers, area controllers, and their shift supervisors. Direct Support Personnel consist of those employees who maintain and secure the functionality of the IT and OT tools used by Control Room Operators.

## Scenario Development

Given the extensive work within the electric industry to develop business continuity plans supported by redundant physical and IT infrastructure, many organizations already have taken steps to utilize their ability to operate from more than one location. Accordingly, the emphasis now must be on the development of risk scenarios that can identify potential gaps in existing plans given the unique nature of a pandemic's effect on personnel availability.

Each scenario was developed to describe an escalating impact to control room personnel at their primary and secondary location (or both). The scenarios will test the effectiveness of social distancing and quarantine, the availability of mutual assistance, and the need for proactive testing of priority employees to quantify the current risk level explicitly. The scenarios are accompanied by corresponding mitigation strategies that represent existing industry and government policies, standards, and capabilities, as well as suggested actions going forward.

Many investor-owned electric companies, public power utilities, electric cooperatives, and federal government-owned utilities took proactive steps to isolate their control center facilities from external visitors and non-essential employees early in the pandemic, leveraging the presence of back-up control centers, self-quarantining of employees, and multiple shifts to maximize social distancing.

Accordingly, the scenarios are designed to anticipate the logistical and operational challenges associated with the following conditions:

- Single operator impacted (either site)
- Single operator impacted (both sites)
- Shift compromised (either site)
- Shift compromised (both sites)
- Site compromised (either site)
- Site compromised (both sites)

## Possible Mitigation Strategies for Scenarios

This section first describes universal preventive measures that should be considered prior to having any control center personnel diagnosed with COVID-19, in addition to measures that would apply in most scenarios where employees are diagnosed with the virus. Thereafter, specific recommendations for the escalating impacts of the above scenarios are provided.

### Universal Mitigation Strategies

- Union leadership should be involved in discussions around possible mitigation strategies from the beginning to ensure transparency and collaboration.
- Compensation, attendance and reliability, PTO, and related policies that will apply during these conditions should be developed and communicated proactively.

- Social distancing at work and on personal time should be encouraged; opportunities to create greater physical separation of control room operator workstations should be identified; adjacent rooms should be utilized where possible; and interactions across shifts should be eliminated.
- Good personal hygiene practices should be reinforced, and employees should self-administer wellness checks at home prior to departure for his or her shift. CDC and state health department information should be posted at the entrance to control rooms and pre-shift safety-hygiene message(s) should be delivered.
  1. Minimize direct contact (maintain 6' distance) and indirect contact, where possible leveraging gloves prior to contacting non-sanitized shared surfaces.
  2. Routine handwashing, leveraging soap & water for at least 20 sec or leveraging an alcohol-based hand sanitizer (containing 60+% alcohol).
- Provide clear symptom reporting guidance to employees around at-home self-administered wellness checks and/or observations while on-shift:
  1. Fever (person feels warm to the touch, reports having been feverish since last report, or has an actual measured temperature of 100.4°F) that has persisted for more than 48hrs.
  2. Or, fever AND one of the following:
    - Persistent cough;
    - Difficulty breathing;
    - Appears obviously unwell.
- The CDC's most current travel advisories should be built into event planning and travel arrangements, and practices to increase awareness of employees' personal travel plans to areas with active advisories should be considered.
- Employees who travel to a location with a CDC Level 3 Travel Health Notice should be required to adhere to a 14-day self-quarantine at home and should be cleared by organization health services, **if applicable**, before they return to work.
- COVID-19 testing of asymptomatic control room operators and support staff should be required to the extent available.
- The frequency and extent of cleaning and disinfecting surfaces and equipment that comes into routine contact with multiple people should be increased.
- In the event exposure occurs, resources should be secured, and processes established for further sanitizing and segregating work areas. Suggested cleaning procedures should include the following within 6 feet of the exposure in all directions:
  1. Cleaning porous (soft) surfaces near workstation (e.g., cloth, leather, faux leather seats within manufacturers guidelines);
  2. Cleaning non-porous (hard) surfaces near work-station (e.g., desk, peripherals, communication devices, hard-chairs, etc.) with disinfectant products with EP-approved emerging viral pathogens claims that are expected to be effective against the virus that causes COVID-19 (SARS-CoV-2) and ensure these products are compatible with surfaces and components. All products should be used according to label instructions.
  3. Cleaning lavatories used by the symptomatic employee, including door handle, locking device, toilet seat(s), faucet(s), washbasin(s), adjacent walls, and counter.

4. Properly disposing of any items that cannot be cleaned. Paper procedures, maps, etc.)

Additional guidance from the CDC on cleaning and disinfecting a facility can be found on-line at:

<https://www.cdc.gov/coronavirus/2019-ncov/prepare/disinfecting-building-facility.html>

- Individually assigned peripheral equipment (mice/keyboards/handsets/chairs) should be provided.
- A dedicated building entrance that is a significant distance from all other employees should be provided for all personnel working in the control center.
- Outside visitors should not be allowed in control centers (e.g., no tours or non-essential personnel from the same organization).
- Additional access restrictions, such as limiting visitors or nonessential meetings within spaces in proximity to control centers, should be implemented.
- Non-badged contractors/vendors should be screened with a health questionnaire and temperature check before being allowed onsite for deliveries, repairs, etc., and access during this time should be limited to critical activities only.
- Crews on shift work schedules should be segregated. System operators should be split (days/nights or split individual shifts) between primary and backup control centers. Operating night shifts and day shifts in different locations will provide a 12-hour window between occupation (e.g., allow for enhanced cleaning).
- Control room operators should be reduced to minimum (active desks), and they should be rotated in and out on a 7-day or 14-day schedule. (Be cautious of length of shifts when considering length of time.)
- Business continuity plans should have clearly defined thresholds and procedures for initiating organization shelter-in-place, sequestration, and quarantining of control center personnel.
  1. Shelter-in-place: State directive to operate/reside within the location (building) one currently is located.
  2. Sequestration: Protective sequestration involves physical isolation to protect a healthy population from a pandemic. Requires a degree of certainty that the population is healthy via testing, rather than an assumption of health, lest the entire sequestered employee population is compromised.
  3. Quarantining: A state of physical isolation due to potential exposure prior to reintroduction into a healthy employee population.
- A complete healthy shift should be sequestered and held in reserve for extreme scenarios such as when minimum staffing levels cannot be met.
- A resource plan should be developed for potential use of retirees, supervisors, managers, and engineers with the requisite skills to backfill control room operator and support staff in the event staffing is reduced due to COVID-19 infections.

- Control center support staff (engineering, transmission scheduling, compliance, etc.) should be allowed to work remotely (e.g., VPN) to the extent permissible within remote access and cybersecurity requirements of the organization.
- Information and communications technology resources should be appropriate to accommodate increased use of remote work arrangements consistent with business continuity plans, without compromising security. Consider conducting planned stress tests for these arrangements.
- Organizations should anticipate and prepare for coronavirus-themed opportunistic social engineering attacks. Spearphishing, watering hole, and other disinformation tactics commonly are used to exploit public interest in significant events. Steps to ensure continued visibility and maintenance of cyber assets should be taken in the event of staffing disruptions.
- Logistics to house operators onsite, including bedding, hygiene facilities, entertainment, and food accommodations, should be developed.
- Mutual assistance and sharing of operators should be considered.
- Organizations should consider declaring CIP Exceptional Circumstance to the extent necessary if staffing levels are reduced to a minimum level as a mitigation strategy.

### Scenarios 1&2 (single operator impacted at one or both sites)

Control Room Operator or Direct Support Personnel in the primary or secondary control room is confirmed with COVID-19. Both categories of employees work in tightly controlled shifts in terms of working hours, skill sets, and physical proximity during work. A positive case in any shift comes with a high risk of infection for other personnel in the same shift if the infected individual is not identified quickly.

While there is some amount of redundancy in skills sets on a single shift allowing for a degree of interchangeability, this option does not apply to all positions and is limited in both the quantity of people available and the duration of operational tempo. Having at least one confirmed case at both locations potentially compromises the standard redundant-site model of continuity, but still allows for proactive quarantine and reallocation of shift personnel if possible.

#### **Mitigation Strategies:**

- All staff on shift with the impacted operator(s) should immediately be home quarantined, and the work hours/coverage of all non-impacted shifts extended.
- A body temperature screening process should be used, or symptoms reviewed before admission into control rooms. This is typically required to be performed by licensed medical professionals and may require relief from HIPAA requirements for supervisors/managers to perform if necessary. Appropriate PPE should be used.
- Conservative/reduced field operations should be implemented to reduce the workload of control room staff (reduce the number of switching orders to process).
- A supplemental staffing plan should be implemented, and refresher training and simulations offered for supervisors, managers, engineers, and retirees with the requisite skills to backfill control room staff in the event control center staffing is further reduced due to COVID-19 infections.



- The family situations of operators impacted by quarantine should be considered and assistance/support offered where needed to ensure quarantined operators do not feel they are placing their family at risk (e.g., transportation, housing, childcare, eldercare, video chats).
- Organizations should consider sequestering employees in their homes rather than in a separate location away from their families (address individual employee personal circumstances).

### Scenario 3&4 (shift compromised at one or both sites)

Multiple Control Room Operators and/or Direct Support Personnel in any single shift at both the primary and backup control rooms have been confirmed with COVID-19. This scenario assumes at least one shift in both facilities is infected, or multiple shifts in the case of an organization that only has one functioning control center. This will limit the value of social distancing between the staffs of the two control centers and raises the likelihood of close physical contact with infected individuals at both locations. These circumstances also quickly overextend the ability to reallocate personnel between shifts since at least one complete shift at each location has been compromised.

The Control Center Continuity Working Group is continuing to develop mitigation strategies for this scenario, which may include leveraging mutual assistance networks, identifying retired or relocated qualified control center personnel, or pursuing on-the-job training for new control center personnel. Additional mitigation strategies will be included as an addendum to this document in future versions.

As noted in the strikethrough below, a previous version of this guidance recommended that there should be a single control room for operators who have confirmed cases of COVID-19 in the event minimum staffing levels cannot be maintained with employees who do not have the virus. To clarify the intention of this statement, the Control Center Continuity Working Group is recommending that this approach only be followed in extreme situations that cannot be mitigated by any other means. Any employee that shows symptoms or tests positive for COVID-19 should be separated from other employees, customers, and visitors and sent home, per CDC guidelines, if at all possible.

#### Mitigation Strategies: (Updated: March 30, 2020)

- The same strategies outlined in Scenario 1&2 apply.
- Non-impacted shifts should be sequestered onsite.
- ~~There should be a single control room for operators who have confirmed cases of COVID-19 in the event minimum staffing levels cannot be maintained with employees who do not have the virus.~~
- If available, onsite 24-hour medical care should be considered.
- Vending services should be shut down, and food and drinks for quarantined staff brought in as individually wrapped items.

### Scenario 5&6 (site compromised at one or both locations)

The primary and backup control rooms have a significant number of Operators and/or Direct Support Personnel impacted with COVID-19, compromising the entire site. Multiple infected personnel in this scenario also assumes that, in addition to both facilities having personnel who test positive, more than

one shift at each location is affected. This will exacerbate the problem of realigning personnel who are cross trained to perform specific functions or using in-house redundancy of employees without knowing which specific skills are needed. Additionally, this also could lead to the compromise of a control center to the degree that it is no longer usable until it can be sanitized properly.

### **Mitigation Strategies:**

- Operations should be sequestered fully onsite.
- If available, onsite 24-hour medical care should be considered.
- Food and drinks for sequestered staff should be brought in as individually wrapped items.
- Per the guidance above, a body temperature screening process should be used, or symptoms reviewed before re-admission into control rooms, and recovered staff should be isolated from infected staff in a plan to return to healthy pool.
- The family situations of operators impacted by sequestering should be considered, and they should be offered assistance/support where needed to ensure sequestered operators do not feel they are placing their family at risk (e.g., transportation, housing, childcare, eldercare, video chats).

## **Sequestration Guidelines and Considerations**

Control center personnel working in close proximity for extended periods proactively can be isolated in order to limit their chances of contracting COVID-19. In this document, the following definitions apply to the different means of isolation:

- **Shelter-in-place:** An employee should remain in his/her private residence with immediate family members only. Travel outside the home should be restricted to essential needs and functions only, including food, medicine, and work deemed critical. This form of movement restriction is largely consistent with state-level orders and directives.
- **Self-quarantine:** Following the onset of symptoms or the possible exposure to a positive case of COVID-19, an employee should remain in isolation from interpersonal contact and should not leave his/her designated area of quarantine (i.e., his/her home).
- **Sequestration:** An employee with no confirmed exposure risk and no symptoms of COVID-19 proactively is isolated for an extended period for the purpose of performing his/her job function on-site. No movement beyond the designated sequestration area and no interpersonal contact with individuals outside the defined area for the designated period are allowed.

### **Sequestration Triggers:**

Sequestration is likely to be the most effective means of reducing risk to critical control center employees during a pandemic, but it is also the most resource- and cost-intensive option to implement. Additionally, sequestration presents additional challenges to employees and their families at a time when stress and uncertainty already are running high. Careful consideration of the circumstances or “triggers” that dictate a decision to enact sequestration is necessary for determining if and when sequestration is the best option.

The decision to enact sequestration is driven by individual organization risk assessments and should not be based on any one criterion or data point alone, but it should consider the situation for a specific control center holistically. Considerations may include, but are not limited to, the following:

- The number of people showing symptoms or testing positive as a percentage of the population for the government jurisdiction (county or municipality) where the control center is located. This is largely based on the availability of testing for COVID-19 and requires constant communication with staff who are both on- and off-shift to monitor their health. Consideration should be given both to the location of the control center and the home addresses of employees who commute from outside the jurisdiction where the control center is located.
- The number of people showing symptoms or testing positive who perform certain job functions, primarily based on particular certified skills and the ability to hire a replacement. Acceptable risk should be based on the minimum staffing requirements of the control center and should include the availability of a reserve shift for critical position backfills. For example, shift supervisors are commonly certified in all positions in the control center, and the unavailability of more than one-third of a single organization's shift supervisors could compromise operations.
- The rate of infection spread across a geographic region. Considering the rapid spread of COVID-19, which is currently doubling the number of confirmed cases every 3-5 days or more frequently in some areas, special care should be taken to identify the point at which control center personnel are more likely than not to come into contact with an infected individual during their off-shift hours. The degree of risk to an employee is affected by the government and private-sector measures implemented to limit the spread of the virus, such as the closing of schools, daycares, public venues, restaurants, etc., or the implementation of a state- or city-wide shelter-in-place mandate.

Other possible considerations for activating control center sequestration may include:

- Screenings based on control center absenteeism rates
- State or municipal emergency directives that apply to the jurisdiction in which a control center is located
- Reliability Coordinator (RC) directives that require operation of the affected control center to ensure reliability of the bulk electric system for the duration of the pandemic
- Reputational risks of either taking or not taking action to ensure continued operation of the affected control center (e.g., in support of the RC)

In addition to understanding the possible triggers for enacting sequestration, operators should give consideration to factors that may indicate that sequestration is not the best solution for a control center at a particular time. For instance, in regions that already have seen high numbers of confirmed cases or rapid rates of community transmission, the ability to test every sequestered employee proactively is a critical prerequisite before sequestration can be enacted. If sufficient testing is unavailable in these circumstances, it may be 'too late' for sequestration to be an effective means of reducing risk to control center employees. Conversely, if a sequestration plan is put into effect too early, it may become challenging to sustain operations for the necessary duration of the sequestration.

## Sequestration Strategies:

Strategies for sequestering control center personnel are driven by organization risk assessments and geographically specific factors, such as the remoteness of the facility itself and proximity to large clusters of positive cases.

An effective sequestration may require alterations to existing schedules and alignment of personnel:

- Shift schedules should change from 8 hours to 12 hours. This reduces personnel turnover and ensures that shift hand-offs occur only between the same two groups. This eliminates the potential cross-contact of shift personnel with those of a second/back-up control center and reduces the total number of interactions.
- A company-directed self-quarantine of a complete reserve shift ensures that all critical functions can be performed in the event that a shift becomes compromised. To ensure their availability as a complete team, a shift should not be “cannibalized” to supplement individual positions in a different shift.
- All personnel who can perform their essential tasks remotely should be moved off-site. Organizations have taken steps rapidly to develop the IT infrastructure necessary to move support tasks off-site that previously were not accessible remotely. This allows for a bare minimum number of people in the facility that houses the control center to limit contact further.

To ensure that a sequestration plan is implemented effectively and that enough employees are willing to volunteer to be sequestered, the quality and availability of support services are critical. Support plans should include provisions for the following:

- **Duration:** A minimum of 14 days is necessary in order to ensure the availability of a replacement sequestered shift, given the minimum length of an ordered quarantine for exposure. The current maximum in practice is 6 weeks, driven by the expense associated with providing the support services for shifts and the exposure risk associated with shift changes.
- **Lodging:** Most control center facilities do not have existing designated lodging space, or the conditions were designed for temporary use during more traditional circumstances such as storm responses. Given the extended nature of sequestered shifts, control centers either are retrofitting existing space to accommodate personnel for longer periods of time, or they are procuring sleeping trailers and recreational vehicles to house operators on-site. Accommodations should limit the number of people in each designated sleeping space for comfort (current practice is two per trailer) with consideration for gender. Current cost assessments identify 6 weeks as cost parity for buying trailers vs. renting them.
- **Family Support:** Connectivity with family members is essential to ensuring the ability of operators to perform their jobs. Addressing unique family requirements such as childcare, medical requirements, transportation needs, and food/groceries should be considered during discussions with volunteers.
- **Food:** There are three primary strategies to provide food to shift personnel, each with a requirement to determine the frequency of delivery to limit exposure risk from frequent interactions with delivery personnel and contracting provisions regarding the sanitation practices of the food provider to ensure the lowest possible risk:
  - When adequate kitchen facilities are available, groceries can be delivered, and operators can prepare their own food.

- Prepared meals or catering can be provided.
- Food preparation personnel (a cook) can be included in the sequestered team.

Communal dining facilities should be limited during the initial 14 days to limit the risk of exposure to all personnel.

- **Medical Services:** Ongoing monitoring of sequestered employees' health is necessary to maintain the integrity of sequestration and to ensure all employees' continued safety. At a minimum, this may include routine self-testing for symptoms such as fever, with the ability to call upon medical professionals as needed. Alternatively, a medical professional can be sequestered on-site to provide services to all on-site shifts, reducing the external exposure risk.
- **Cleaning/Sanitation Services:** The ongoing cleaning of the control center, lodging, and common areas is essential to the health and welfare of operators. As with food service, there are tiers of exposure risk based on the strategy selected:
  - Shift personnel may be provided with the required supplies to clean common and individual spaces themselves.
  - External cleaning services, including personnel who are equipped with all necessary PPE to limit the risk of exposure, may be contracted to come on-site as needed.
  - Cleaning staff may be sequestered on-site.

Finally, for sequestration to be activated effectively, a plan must be developed completely and ready for immediate implementation, including a schedule for the full duration of the sequestration, provisions for support services, and identification of volunteers.

## Additional Resources

### FERC, NERC Provide Industry Guidance to Ensure Grid Reliability Amid Potential Coronavirus Impacts



**Federal Energy Regulatory Commission**



**March 18, 2020**

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#### **FERC, NERC Provide Industry Guidance to Ensure Grid Reliability Amid Potential Coronavirus Impacts**

The Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corporation (NERC) announced today they are taking steps to ensure that operators of the bulk electric system can focus their resources on keeping people safe and the lights on during this unprecedented public health emergency.

FERC and NERC are using regulatory discretion to advise all registered entities that they will consider the impact of the coronavirus outbreak in complying with Reliability Standards as follows:

- The effects of the coronavirus will be considered an acceptable basis for non-compliance with obtaining and maintaining personnel certification, as required in Reliability Standard PER-003-2, for the period of March 1, 2020 to December 31, 2020. Registered entities should notify their Regional Entities and Reliability Coordinators when using system operator personnel that are not NERC-certified.
- The effects of the coronavirus will be considered an acceptable reason for case-by-case non-compliance with Reliability Standard requirements involving periodic actions that would have been taken between March 1, 2020 and July 31, 2020. Registered entities should notify their Regional Entities of any periodic actions that will be missed during this period.
- Regional Entities will postpone on-site audits, certifications and other on-site activities at least until July 31, 2020. Registered entities should communicate any resource impacts associated with remote activities to their Regional Entities.

FERC and NERC recognize the uncertainties regarding the response to and recovery from the coronavirus outbreak and will continue to evaluate the situation to determine whether to extend these dates. Our shared goal is to ensure all registered entities balance the concerns for the health and welfare of their workforce while staying focused on the mission of supplying power to consumers across North America.

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# Mutual Assistance Considerations

**Updated: March 30, 2020**

**Changes since the last version are highlighted in red**

## Pandemic Mutual Assistance Checklist

This checklist is designed to provide requesting and responding investor-owned electric companies, public power utilities, and electric cooperatives guidance on how to conduct mutual assistance during the COVID-19 pandemic.

Investor-owned electric companies, electric cooperatives, and public power utilities are committed to protecting the people working for them and to ensuring energy operations and infrastructure are supported throughout an emergency. The items in this checklist can help provide guidance for mutual assistance efforts while protecting the health and safety of employees, customers, and communities. These practices are suggested for all organizations, regardless of the number of confirmed COVID-19 cases in the area.

This checklist may be used when providing mutual assistance for outage incidents during the COVID-19 pandemic. It also may be used when providing mutual assistance if a requesting organization is so impacted by COVID-19 cases that it is not able to conduct normal daily operations without assistance.

Organizations providing or requesting mutual assistance should follow the terms and conditions of their existing mutual assistance or mutual aid agreements.

### Work Practices

- ☐ Responding crews should follow their organization's policies and procedures, and **responding investor-owned electric companies, public power utilities, and electric cooperatives should work to minimize the chance of infected workers travelling. A responding organization may wish to use the COVID-19 Questionnaire with their employees before sending them to the requesting organization. ([See COVID-19 Mutual Assistance Questionnaire.](#))**
- ☐ Requesting investor-owned electric companies, public power utilities, and electric cooperatives should minimize movement of crews to different regions in their territory. By assigning the same crews to the same work areas, cross pollination and potential exposures are limited. Note, this may require organizations to need additional resources and could impact restoration times.



- ☐ Investor-owned electric companies, public power utilities, and electric cooperatives should consider moving toward more isolated and self-contained responding teams to limit the exposure between crews who work for the requesting organization and responding crews. Keep crew teams intact to minimize exposure and execute “transfer of control” best practices for restoration when possible to limit exposure between crews of the requesting organization and responding crews.
- ☐ When information is available, requesting investor-owned electric companies, public power utilities, and electric cooperatives should avoid sending responding crews into areas **or facilities** with significant COVID-19 outbreaks. The requesting company should restore in those areas.
- ☐ When information is available, the requesting organization should provide full situational awareness of the COVID-19 impact, the number of cases in the community (or region), and what protective measures are in place to responding crews and their organization, with regular updates.
- ☐ Requesting investor-owned electric companies, public power utilities, and electric cooperatives should clarify how long they expect responding crews to be in their area.
- ☐ Requesting organizations should identify a liaison who can work with each responding entity to provide information about local conditions. Consider providing this information in advance of receiving responding crews.
- ☐ Requesting organizations should try to minimize person-to-person contact for material distribution and use drop points.
- ☐ Requesting organizations should use technology for onboarding and briefings (e.g., online conferencing services, conference calls) or conduct briefings in the field to reduce large meetings. Have safety onboarding on videos that can be distributed to crews in advance, with conference calls for Q&A. Conduct daily briefings remotely where feasible.
- ☐ If practicable, pre-staging should be avoided unless the threat is imminent.
- ☐ Requesting organizations should look for opportunities within the restoration process to execute the function remotely [dispatching functions, advanced metering infrastructure (AMI) functionality, assessment, etc.].
- ☐ **Both requesting and responding organizations may want to consider screening of crews using non-contact thermometers before deployment and upon arrival to verify employees do not have fevers above 100.4 F.**

### General COVID-19 Safety Practices

- ☐ If you are sick or have any flu-/virus-like symptoms, report this immediately to your supervisor and consult your physician.
- ☐ Cover your coughs and sneezes with a tissue, then immediately throw the tissue in the trash.
- ☐ Wash your hands often with soap and water for at least 20 seconds, especially after going to the bathroom; before eating; and after blowing your nose, coughing, or sneezing.
- ☐ Avoid touching your eyes, nose, and mouth with unwashed hands.



- ☐ Regularly clean your phones and handheld devices as these are some of the dirtiest items we carry.
- ☐ Maintain social distancing whenever possible [six (6) feet distance from anyone coughing or sneezing]. Avoid shaking hands and touching others.
- ☐ Use “non-circulating mode” for vehicle air conditioning/heating/ventilation.

## Staging Sites

- ☐ Instead of large staging sites, requesting organizations should consider having multiple, smaller staging sites to limit contact with/exposure to crews. Design smaller staging sites to allow CDC distancing recommendations to be followed (currently 6 feet of distancing at all times). Note: this may require organizations to request more self-sufficient resources, such as crews from investor-owned electric companies, public power utilities, and/or electric cooperatives rather than contractors.
- ☐ Cleaning supplies, hand sanitizer, sanitation supplies, etc. should be available for all crews located at staging areas.

## Lodging and Meals

- ☐ Requesting organizations should establish lodging and dining sites where social distancing can be established, and the requesting organization can manage and control access and direct sanitation.
  - This can include appropriately sized sleeper trailers, tents, renting out entire hotels/motels, or nontraditional spaces for crew-only use.
  - Keep crews that are working together in the same lodging and dining facilities.
  - Have a plan for feeding crews in the event restaurants are closed by government order.
  - Have lodging, dining, and common areas cleaned following CDC guidelines. ([See CDC recommendations.](#))
  - Cleaning supplies, hand sanitizer, sanitation supplies, etc. should be available for all crews located at all lodging and meals areas.
  - Provide laundry service, if needed.
  - Minimize travel in large vehicles such as buses by having crews use trucks for transportation between lodging and work sites.
  - Have vehicles cleaned following CDC guidelines. ([See CDC recommendations.](#))
  - Try to minimize exposure by providing box lunches, snacks, water, etc.

## External Outreach and Communication

- ☐ Requesting organizations should proactively communicate to regulators and government partners that power restoration and recovery may be slower due to the new response regime. Establish and disseminate information to customers that travel and restoration times may be longer.
- ☐ Requesting organizations should proactively communicate with customers about social distancing efforts. Ensure responding crews have consistent messaging and practices.
- ☐ Requesting organizations should work with local and state officials to ensure responding crews are designated as critical workers and are able to travel to and through the requesting entity's service territory.

## Health Issues

- ☐ Requesting organizations and responding crews should utilize the COVID-19 Visitor Questionnaire to evaluate health risks. ([See COVID-19 Mutual Assistance Questionnaire.](#))
- ☐ Workers' temperatures should be taken daily. If a worker has a temperature above 100.4 F, he/she should be removed from the workforce. The requesting organizations should coordinate with the employees' organization and follow CDC guidelines on what to do if you are sick. ([See CDC recommendations.](#))
- ☐ Workers who become ill should follow CDC guidelines. ([See CDC recommendations.](#))
- ☐ Workers should minimize the use of currency and use credit cards instead to avoid hand-to-hand contact.
- ☐ Follow CDC recommendations for when individuals infected with COVID-19 can discontinue home isolation and return to work. (See CDC recommendations.)

## CDC Recommendations

### Interim Guidance for Business and Employers:

<https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html>

### Cleaning and Disinfection Recommendations:

<https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/cleaning-disinfection.html>

### What to Do If You Are Sick:

<https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/steps-when-sick.html>

### Guidance for Large Events:

<https://www.cdc.gov/coronavirus/2019-ncov/community/large-events/index.html>

### Interim Guidance for Discontinuation of Home Isolation for Persons with COVID-19

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-in-home-patients.html>

The health and well-being of employees, strategic partners, families, and visitors remains our industry's top priority. To prevent the spread of COVID-19 and to reduce the potential risk of exposure to our workforce, contractors, and visitors, we are requesting mutual assistance workers fill out a simple screening questionnaire. The participation of the screening questionnaire is required for all visitors/contractors who are expected onsite and for employees who are responding to a mutual assistance request at another investor-owned electric company, public power utility, and/or electric cooperative. This will be required for each contract employee or visitor prior to coming onsite or travelling to another investor-owned electric company, public power utility, and electric cooperative.

Visitor's Name:	Personal Phone Number (mobile/home):
Visitor's Organization:	Name of Host Organization Sponsor:
Facility Name:	
<b>SELF-DECLARATION BY VISITOR</b>	
<p>Have you returned from any of the countries listed by the CDC as a travel/health advisory warning for Covid-19 Level 3 or higher in the last 14 days? Current list can be found here: <a href="https://wwwnc.cdc.gov/travel/notices">https://wwwnc.cdc.gov/travel/notices</a></p> <p><input type="checkbox"/> Yes   <input type="checkbox"/> No</p>	
<p>Have you had close contact with or cared for someone diagnosed with COVID-19 within the last 14 days?</p> <p><input type="checkbox"/> Yes   <input type="checkbox"/> No</p>	
<p>Have you been in close contact with anyone who has traveled within the last 14 days to one of the countries listed as a level 3 or higher travel/health advisory by the CDC for Covid-19?</p> <p><input type="checkbox"/> Yes   <input type="checkbox"/> No</p>	
<p>Have you experienced any cold or flu-like symptoms in the last 14 days (to include fever of 100.4 degrees F or higher, dry cough, difficulty breathing, or shortness of breath)?</p> <p><input type="checkbox"/> Yes   <input type="checkbox"/> No</p>	
<p>Have you or any member of your household traveled on a cruise ship within the last 14 days?</p> <p><input type="checkbox"/> Yes   <input type="checkbox"/> No</p> <p>Please report any air travel, cruise ship travel, and/or destinations visited within the last 14 days, both work-related and personal travel.</p>	

If you answer “yes” to any of the questions above, access to the facility will be denied.

Signature (Visitor): \_\_\_\_\_  
Date: \_\_\_\_\_

**Note:** If you plan to be on host’s property for consecutive days and your response to this self-declaration changes, please notify your host organization sponsor immediately.

**Please complete and return this form electronically to: POC**

ACCESS TO FACILITY (circle one):      APPROVED      DENIED

# Generation Operational Continuity

## New Section: March 30, 2020

This document provides guidance to investor-owned electric companies, public power utilities, electric cooperatives, independent power producers, and federal government-owned utilities responsible for the safe and reliable operation of generation power plants and generation control centers during and throughout the COVID-19 pandemic. This document develops credible scenarios that could impact generation operations, identifies mitigation options, supports information sharing across the industry, and outlines needed government actions.

## Governmental Support Needs

The mitigation strategies for the scenarios described below cannot be executed unless: (1) COVID-19 testing is available and streamlined for essential personnel who work in shift environments, i.e., operations personnel; (2) relief from certain regulatory obligations is obtained to ensure the continued availability of operators and other skilled employees; (3) travel restrictions for the general public exclude personnel essential to the reliable operation of generating facilities; and (4) supplies for cleaning/hygiene are readily available.

A summary of specific government actions ESCC leadership could advocate for to ensure successful mitigation of risk to control center continuity is presented below:

- **High Priority**
  - Request that governmental authorities direct medical facilities to prioritize testing for asymptomatic generation control room operators, operator technicians, instrument and control technicians, and the operations supervisor (treat comparable to first responders) in advance of sequestered, extended-duration shifts; and obtain state regulatory approval for corporate health services organizations to administer testing for coronavirus to essential employees, if applicable.
  - Request that governmental authorities direct medical facilities to prioritize testing for asymptomatic control room operators (treat comparable to first responders) in advance of sequestered, extended-duration shifts; and obtain state regulatory approval for corporate health services organizations to administer testing for coronavirus to essential employees, if applicable.
  - If local, regional, state, or federal governments enforce a populace-wide quarantine/curfew or other travel restrictions, ensure that operators of generating facilities still can move freely outside of hours.
  - Request EPA and state level permitting agencies allow for non-compliance operations of generating facilities in the event sufficient resources or personnel are not available.

- **Medium Priority**

- Obtain authority for priority supply of sanitizing supplies and PPE for generating facilities.
- Obtain state approval for non-medical professionals (such as generating facility employees) to administer health questionnaires and temperature checks without ADA or other legal constraints.

## Identifying Essential and Critical Generation Personnel

The personnel needed to staff and operate generating facilities are essential to the reliable operation of the energy grid. The facilities needed to perform these functions generally are well-isolated and physically secure, or at least conducive to the sequestration of on-site staff as needed. However, given the long lead times required to train personnel to operate and maintain control systems at generating facilities properly, the limited number of people with these qualifications places a higher risk to reliable operations and requires a higher priority for protection from the spread of COVID-19 than the general population. Individual organizations still will have discretion to identify essential personnel unique to their organization, but a more uniform approach to categorizing staff will support the communication of likely areas of government support at the local, state, and federal levels.

### Non-Nuclear Generation Personnel

Specific to non-nuclear generating facilities, each organization has employees who fit into two categories, with essential personnel being extremely difficult to replace given training and familiarization with each specific generation plant control room:

- **Tier One – Essential Generation Employees**

- Control Room Operators
- Operator Technicians
- Instrument and Control Technicians (I&C Techs)
- Operations Supervisor/Team Leader/Shift Supervisors

- **Tier Two – Critical Generation Employees**

- Chemical/Lab Technician
- Maintenance (Mechanical, Electrical)
- Materialman (Warehouse)
- Contractors – Ash Handling, Emergency Maintenance Repair, Critical Commodities, OEM
- Other Support – Engineer, Specialist, Accounting

### Nuclear Generation Personnel

The Nuclear Regulatory Commission (NRC) and federal statutes have very specific reliability and security requirements for the operation of nuclear generating station. Therefore, as it stands, nuclear

generation owners and operators are obligated to staff their plants as normally required.<sup>1</sup> Tier two employees are not required by the NRC, however, the loss of Tier two employees may result in insufficient support for plant operators over time. The job titles of these nuclear generation employees are:

- **Tier One – NRC-required Essential Nuclear Generation Employees**
  - Licensed control room operators and designated supervision
  - Non-licensed operators
  - Radiation protection technicians
  - Fire brigade members and designated supervisor
  - Maintenance personnel (I & C, electrical and mechanical)
  - Armed security officers, armed responders, and other committed positions in the physical security plan
  - Emergency Response Organization positions described in licensee's emergency plan
- **Tier Two – Critical Nuclear Generation Employees**
  - Engineering Support
  - Maintenance Support
  - Management/Administrative
  - Procurement
  - Quality Assurance

## Scenario Development

Given the limited ability of generating facilities to be operated remotely, mitigating strategies and contemplation of other issues must be developed to ensure adequate generating facility availability and operation. The scenario contemplated includes 40 percent workforce attrition, a nine-month pandemic, and no mutual assistance. This scenario will test the effectiveness of social distancing and quarantine and the need for proactive testing of priority employees (and/or essential contractors). Mitigating strategies and other important considerations will be contemplated under the framework below. The mitigating strategies will attempt to represent existing industry and government policies, standards, and capabilities, as well as proposed actions going forward.

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<sup>1</sup> Title 10 Code of Federal Regulations (CFR), Parts 50 and 73, essential workers for commercial nuclear power reactors are specified in each facility's licensing basis. The applicable licensing basis documents are the licensee's Technical Specifications, Physical Security Plan, and Emergency Plan. These documents describe the site-specific positions required for plant operations, physical protection of the plant, and implementing emergency measures – all are needed to maintain the plant's operating license.

## Possible Mitigation Strategies for Scenarios

This section first describes universal preventive measures that should be taken prior to having any essential employees with COVID-9, in addition to measures that would apply in all scenarios where employees are diagnosed with the virus. Thereafter, specific recommendations for the escalating impacts of the above scenarios are provided.

### Universal Mitigation Strategies

- Involve union leadership in discussions around possible mitigation strategies up front to ensure transparency and collaboration.
- Proactively develop and communicate compensation, attendance and reliability, PTO, and related policies that will apply during these conditions.
- Encourage social distancing at work and on personal time; identify opportunities to create greater physical separation of operator workstations; utilize adjacent rooms where possible; eliminate interactions across shifts.
- Reinforce good personal hygiene practices; conduct home self-administered wellness checks prior to departure for shift; ensure CDC & State Health Org flyers are posted at control room entrance(s); deliver pre-shift safety-hygiene message(s).
- Incorporate the CDC's most current travel advisories into event planning and travel arrangements and consider practices to increase awareness of employees' personal travel plans to areas with active advisories.
- Require employees who travel to a location with a CDC Level 3 Travel Health Notice to adhere to a 14-day self-quarantine at home and be cleared by their organization's health services before they return to work.
- Require COVID-19 testing of asymptomatic control room operators and support staff to the extent available.
- Increase the frequency and extent of cleaning and disinfecting surfaces and equipment that comes into routine contact with multiple people.
- Secure resources and establish processes for further sanitizing and segregating work areas in the event exposure occurs.
- Provide a dedicated building entrance, a significant distance from all other employees, for all personnel working in the control room.
- Do not allow outside visitors in control rooms or other designated protected areas (e.g., no tours or non-essential personnel from the same organization).
- Implement additional access restrictions, such as limiting visitors or non-essential meetings within spaces in proximity to control centers.
- Screen non-badged contractors/vendors with health questionnaire and temperature check before allowing on site for deliveries, repairs, etc., and limit access during this time to critical activities only.



- Segregate crews on shift work schedules. Split operators (days/nights) or split individual shifts.
- Cut back control room operators to a minimum.
- Ensure business continuity plans have clearly defined thresholds and procedures for initiating organization's shelter-in-place, sequestration, and self-quarantining of essential personnel.
- Sequester a complete healthy shift (if available) and hold that shift in reserve for extreme scenarios, such as when minimum staffing levels cannot be met.
- Develop a resource plan for potential use of retirees, supervisors, managers, and engineers with the requisite skills to backfill operators and support staff in the event staffing is reduced due to COVID-19 infections.
- Allow generating facility support staff (engineering, compliance, maintenance, etc.) to work remotely to the extent permissible within remote access and cybersecurity requirements of the organization.
- Ensure information and communications technology resources are appropriate to accommodate increased use of remote work arrangements consistent with business continuity plans, without compromising security. Consider conducting planned stress tests for these arrangements.
- Develop logistics to house operators on-site, including bedding, entertainment, and food accommodations.
- Begin planning a 'return-to-work' protocol for mission-essential staff who test positive or are exposed to COVID-19 and complete any required self-quarantine period (usually 14 days). A protocol will be needed to reintegrate these employees back on shift. Use CDC guidance to determine the criteria, as the length of time an employee needs to remain symptom free, if they are exposed at home, and what PPE should be mandated, etc.

### Scenarios – Single Operator Impacted

A mission-essential control room operator or technician in the primary control room tests positive for COVID-19. Both categories of employees work in tightly controlled shifts in terms of working hours, skill sets, and physical proximity during work. A positive case in any shift comes with a high risk of infection for other personnel in the same shift if the infected individual is not identified quickly.

While there is some amount of redundancy in skills sets on a single shift, allowing for a degree of interchangeability, this option does not apply to all positions and is limited in both the quantity of people available and the duration of operational tempo. Having at least one confirmed case during a shift puts the entire crew at risk for infection. The control room would require disinfection. Furthermore, the employees in contact with the infected employee would require observation and possibly testing to clear them to return to work.

#### **Mitigation Strategies:**

- All staff on shift with the impacted operator(s) should immediately be self-quarantined, and the work hours/coverage of all non-impacted shifts extended. Ideally a relief shift would be available to cover the employees removed from duty.
- A body temperature screening process should be used, or symptoms should be reviewed before admission into control rooms. This typically is required to be performed by licensed medical

professionals and may require relief from HIPAA requirements for supervisors/managers to perform if necessary.

- A supplemental staffing plan should be implemented, and refresher training and simulations offered (if needed) for supervisors, managers, engineers, and retirees with the requisite skills to backfill control room staff in the event control center staffing is further reduced due to COVID-19 infections.
- The family situations of operators impacted by self-quarantine should be considered, and assistance/support should be offered where needed to ensure quarantined operators do not feel they are placing their family at risk (e.g., transportation, housing, childcare, eldercare, video chats).
- In order to return employees back to work, access to testing and analysis must be prioritized and made available.

# Supply Chain Considerations

## New Section: March 30, 2020

This document provides guidance that investor-owned electric and/or natural gas companies, public power utilities, and electric cooperatives can consider for maintaining adequate supply of inputs and physical equipment during this health emergency. Lists were developed for consideration so that both the volumes of the supply chain need, and the geographic location of suppliers can be determined. Clearly, the extent and duration of this emergency will influence the importance of one supply chain component compared to another.

The three lists provided are:

- Industry Critical PPE, Tier I & II
- Power Delivery Materials
- Bulk Chemicals Needed for Power Generation and Delivery

These lists were collected from organizations across the industry. The intent of the content is to serve as a general resource of information and is not an industry standard. This document is evergreen and will be updated regularly as additional guidance is received.

It is acknowledged that access plays a key role both for organizations and their suppliers in a pandemic. The access issue is covered more fully in the access section of this Resource Guide.

## Industry-Critical Pandemic PPE

The purpose of this section is to list industry-critical personal protective equipment (PPE) needs for pandemic planning purposes. Tier I items are those items that serve an immediate need where critical infrastructure workers are subject to contact. Tier II are items that are not needed at the time of contact but are in the horizon of the planning scenario of nine months and a 40 percent reduction in workforce.

### Tier I

- Nitrile gloves
- Shoe covers
- Tyvek suits
- Goggles / glasses

- Hand sanitizer
- Dust masks
- N95 respirators
- Anti-bacterial soap
- Trash bags

## Tier II

- Anti-bacterial wipes
- Disposable thermometers
- Batteries
- Alcohol wipes
- Antiseptic wipes

## Power Delivery Materials List

The purpose of this section is to list frequently used critical electric power transmission and distribution materials needed for continued safe and reliable operations. It is not intended to include critical spares for major pieces of equipment such as large power transformers. While investor-owned electric companies, public power utilities, and electric cooperatives maintain a certain stock level of the materials that they frequently use, normal consumption rates, potential spikes in regional demand driven by storms or hurricane landfalls, or a disruption to transportation networks rapidly could deplete these stocks over a broad area. Maintaining a functional manufacturing and delivery supply chain for these materials will support safe and reliable operations over the planning scenario of nine months and a 40 percent reduction in workforce.

### Broad categories

- Cable (bulk) and accessories
- Common supplies
- Conductor (bulk) and accessories
- Gases and chemicals
- Insulators
- Metering items
- Poles, structures, and accessories
- Sectionalizing and protection items
- Specialized hardware

- Street lighting items
- Transformers and accessories
- Substation control room and communication equipment

### Cable (bulk) and accessories

- Cable connector block, lv insulated - various types
- Cable outdoor termination kit - various voltages and types
- Cable, fiber optic - various types
- Cable, lv control -various types
- Cable, primary ug - various sizes and voltages
- Cable, quadruplex urd - various sizes
- Cable, triplex urd - various sizes
- Conduit and fittings - various sizes
- Termination, fiber optic - various types
- Ug cable arrester elbow - various voltages and types
- Ug cable elbow - various voltages and types
- Ug cable splice kit - various voltages and types
- Wire, optical ground (opgw) - various sizes

### Common supplies

- Batteries, common - various types
- Batteries, power tool - various types
- Indicator bulbs -various types
- Spill absorbent and containment - various types
- Tape, electrical

### Conductor (bulk) and accessories

- Conductor, aac - various sizes
- Conductor, acsr - various sizes
- Conductor, insulated aac - various sizes
- Conductor, insulated copper - various sizes

- Conductor, quadruplex - various sizes
- Conductor, triplex - various sizes
- Connector, auto sleeve for aac, acsr, copper - various sizes
- Connector, compression service - various sizes
- Connector, neutral sleeve for cu, acsr - various sizes
- Connector, sleeve for copper - various sizes

### Gases and chemicals

- Corrosion inhibitor - various types
- Distilled water
- Gasoline fuel
- Diesel fuel
- Lubricant, dielectric - various types
- Nitrogen gas, bottled
- Sulfur hexafluoride gas, bottled

### Insulators

- Insulator, distribution pin - various voltages and types
- Insulator, distribution post - various voltages and types
- Insulator, distribution strain - various voltages and types
- Insulator, distribution suspension - various voltages and types
- Insulator, house knob - various sizes
- Insulator, strain guy - various sizes and ratings
- Insulator, substation post - various types
- Insulator, transmission bell - various types
- Insulator, transmission non-ceramic - various voltages and types and associated hardware
- Insulator attachment/line construction hardware
- Pin, crossarm for insulator

### Metering items

- Meter socket and hub - various types

- Meter, watthour - various types

### Poles, structures, and accessories

- Crossarm, wood - various sizes
- Ground rod
- Ground strap, copper braided - various sizes
- Guy anchor shaft
- Guy anchor, helix - various types
- Hardware, guying - various types
- Lattice tower member, steel - various types
- Pole, steel - various sizes
- Pole, streetlight - various sizes
- Pole, wood - various sizes
- Wire, guy - various sizes

### Sectionalizing and protection items

- Arrester, lightning distribution line - various voltages
- Capacitor, high voltage - various voltages and kvar
- Fuse cutout - various voltages
- Fuse holder, cutout - various sizes
- Fuse link, cutout - various ratings
- Fuse, low voltage control - various ratings and types
- Fuse, substation high voltage - various ratings and types
- Switch, overhead gang operated - various voltages and types
- Switch, overhead single phase - various voltages and types

### Specialized hardware

- Armor rod line guard - various sizes
- Brackets, overhead equipment - various types
- Clamp, parallel groove - various sizes
- Clevis assembly, various types

- Deadend clamp - various sizes
- Deadend grip, preformed - various sizes
- Fasteners, distribution line - various types
- Fasteners, transmission line - various types
- Tie wire, aac - various sizes
- Tie wire, bare copper - various sizes
- Tie wire, preformed - various sizes
- Conductor splicing hardware – various sizes

### Street lighting items

- Streetlight lamp
- Streetlight luminaire
- Streetlight photocell

### Transformers and accessories

- Boxpad, fiberglass padmount transformer - various sizes
- Bushing, padmount transformer - various voltages and types
- Transformer and circuit breaker insulating mineral oil
- Transformer, overhead 1ph - various voltages and kva
- Transformer, padmount 1ph - various voltages and kva
- Transformer, padmount 3ph - various voltages and kva

### Substation control room and communication equipment

- Storage battery cells

## **Bulk Chemicals Needed for Power Generation and Delivery List**

The purpose of this section is to list bulk chemicals critical to power generation and delivery. These chemicals are consumed at various rates by power production processes, so maintaining continued reliable access is critical to generate electricity. The manufacturing and delivery supply chain of these chemicals must remain functional for continued reliable power generation.



- Additives
  - Coal
  - Coal Additives
  - Fuel Oil Additives
- Bulk Chemicals
  - Activated Carbon
  - Ammonia
  - Boric Acid
  - Glycol
  - Hydrazine
  - Hydrochloric Acid (HCl)
  - Lignosulfonate
  - Lithium Hydroxide
  - Sodium Bisulfate
  - Sodium Carbonate (Soda Ash)
  - Sodium Hydroxide (Caustic Soda)
  - Sodium Hypochlorite (Bleach)
  - Sulfur and Molten Sulfur
  - Sulfuric Acid
  - Urea
- Bulk Gases
  - Argon (AR)
  - Carbon Dioxide
  - Hydrogen (H<sub>2</sub>)
  - Nitrogen (N<sub>2</sub>)
  - Oxygen (O<sub>2</sub>)
  - Trailer or Tank Rentals
- Bulk Powders

- CEMS (Protocol) Gases
- Cylinder (Bottled) Gases
  - Argon (AR) Cylinder
  - Carbon Dioxide (CO<sub>2</sub>) Cylinder
  - Cylinder Rentals
  - Hydrogen (H<sub>2</sub>) Cylinder
  - Nitrogen (N<sub>2</sub>) Cylinder
  - Oxygen (O<sub>2</sub>) Cylinder
  - Propane
  - Sulfur Hexafluoride (SF<sub>6</sub>)
- Lime (Hydrated Lime)
- Wastewater Treatment
  - Flocculent
- Water Treatment
  - Demineralizers
  - Mobile Demineralizers Trucks
  - Water Filtration Equipment
  - Water Treatment Systems
- Water Treatment Chemicals
  - Resins
- Water Treatment Services