Lesson Learned

Substation Fires: Working with First Responders

Primary Interest Groups
Transmission Owners
Generation Owners
Distribution Providers

Problem Statement
Two substation fire events occurred that highlight the importance of having an incident response procedure and command structure.

In the first case, a fire occurred due to an arc flash on a 12 kV feeder circuit breaker within an enclosed substation. Although the fire department was dispatched to extinguish the fire, the ability to respond to the substation fire was delayed.

In the second case, a 160 MVA, 230 kV/35 kV Transformer high-side bushing failed in an outdoor substation resulting in multiple operations removing the transformer, a 230 kV bus, and three transmission circuits in a large metropolitan city. An incident command post was established across the street promptly on the arrival of utility and fire department personnel.

Photo credit: Rick McClure

Details - Case 1
A fire resulted from an arc flash incident on a 12-kV feeder circuit breaker cabinet in an enclosed substation. Four technicians present in the substation heard an explosion and began evacuating. Per the safety procedure, they evacuated safely through the front entrance and called their supervisor and distribution operations after ensuring everyone was safe. Not knowing if the fire department was automatically notified, they called 9-1-1. Even though the fire department was dispatched to extinguish the fire, the response was delayed due to the following factors:

- The crew on-site initially thought that the station fire alarm had automatically notified the fire department. However, alarming to the third-party monitoring company about the fire did not operate as designed because the firmware on the alert system had not been updated.

- Having four different individuals from various workgroups in the substation led to confusion of who was the incident commander. Effective communication to the fire department was hampered because it was not clear who had the authority and responsibility to make the call. The operators, who had the responsibility to call the fire department, did not because the on-site crews told them incorrectly that the fire department was already notified and on their way.
- Normal station access was prevented when service for the substation was interrupted. It was discovered that a card reader had a secondary backup battery (unknown to personnel) and it failed to operate due to the battery being dead. Someone from the corporate office was asked to travel with a key to open the substation doors; however, before they could arrive, the fire department had to perform a forced entry into the substation.
- Even though the company had provided the fire department with training on how to respond to substation fires, it was not communicated back to the company that the fire fighters would not enter the substation without an escort. This miscommunication slowed the response of fire fighters to enter the facility.

Corrective Actions (for Case 1)

- The first person to discover a fire must report it via 911 regardless of any central station monitoring that may be present.
- Perform a review of the effectiveness of the fire entry procedure for indoor substations and update it as appropriate along with the applicable training.
- Expand the fire entry procedure to include situations where qualified personnel could already be present at the site. This procedure should addressing the following:
  - Who is the incident commander?
  - Who is supposed to call for the fire department?
  - What assistance if any do they provide the fire department?
- Review fire entry requirements with the fire department to clarify the requirement that utility personnel should not enter the building prior to the fire department declaring the building safe.
- Coordinate with the fire department to establish the practice of immediately mobilizing a foam unit in the case of substation and switchgear fires whether indoor or outdoor.
- Ensure expectations from the fire department are understood and documented on what assistance company personnel are supposed to do.
- Ensure additional equipment inside the substation is maintained. For example:
  - Replace battery backup for card readers
  - Perform maintenance on Fire Alert system including any firmware or software upgrades
- Ensure fire alarms at all substations work on the operator human machine interface (HMI) screen and are audible.
- The third-party fire alarm monitoring company reported that they did not receive automated notification of the fire alarm due to an error in the fire alarm panel’s communication system, and

thus did not call the fire department. The alarm panel communication to the monitoring company was last tested successfully during an annual fire system inspection by the third-party monitoring company. There should be periodic reviews of the fire alarm panel's operation and review communication systems at other facilities managed by the third-party monitoring company.

Details - Case 2

Photo credit: Rick McClure

A 160 MVA, 230 kV/35 kV transformer tripped and locked out on differential protection. Initially, the fault was C-phase-to-ground, but evolved into a 3-phase fault. The fault magnitude was 25,000 amps at 230 kV and it cleared in four cycles. The transformer bank protection operated as intended, but the fault caused the 230 kV C-phase bushing to burst into flames and ignite mineral oil in the transformer. The fault also caused the transformer's 230 kV C-phase lead to drop onto the 230 kV Bus 1, resulting in Bus 1 tripping on differential protection as intended, open-ending three additional 230 kV transmission lines.

As utility personnel arrived on the scene, they found the transformer on fire and the local fire department setting up a command post across the street. People nearby were trying to record everything, which made it harder for company personnel to get where they were needed.

As the utility could not initially determine how long it would take until they could restore power, there were concerns about people gathering in the area and potential looting, so the police department was called in to patrol the area.

After utility personnel had a brief discussion with the local fire department and performed an inspection of the station, it was determined that the transformer failure had caused a loss of the AC station service power supply, and a DC system ground.

The entire station needed to be de-energized along with an additional 230 kV line that was strung over the top of the failed transformer (but did not terminate inside the substation). Utility personnel contacted the control center to report the conditions and began emergency switching remotely to de-energize the station.

After de-energizing all facilities at the station, all DC circuits needed to be de-energized as well due to the DC ground in order to preserve the station batteries (for later switching during post-fire recovery) since the station was without AC power for the battery chargers. Note: This also removed the station phone from service.

Photo credit: Rick McClure

The utility personnel explained to the fire department what was on fire and the amount and type of oil involved. There was a danger that, if the de-energized transformer's fire was simply put out with a water fog, the retained heat in the coils could cause a second fire for up to a few days, so smothering with foam or a longer term fogging and cooling was necessary. The local fire department did not have a foam truck, and the nearest one was over an hour away.

When explaining the situation to the fire department, the utility personnel used a google maps overhead view of the station. This was useful to the fire department's planning their approach and actions. They used a water fog on the transformer to bring down the heat. The use of water fog rather than a stream helped reduce, but did not eliminate, concerns that soot and water would get into the storm drain that leads to the river and that the oil containment could overflow. The foam would have been better if it had been available. Utility personnel used an infrared camera to make sure the equipment was cooled and would not reignite. It took approximately two hours for the local fire department personnel to extinguish the fire.

Corrective Actions (for Case 2)

Approximately 13 hours after the initial fault, all station load was restored by making temporary repairs of station equipment and picking up the load from substation bus-ties. The utility had a new 160 MVA transformer to replace the damaged one plus a temporary 60 MVA transformer stored at the site prior to the incident that expedited permanent repairs (approximately 30 days after the transformer failure).

Lessons Learned (from both events)

FEMA's National Incident Management System (NIMS) defines the **Incident Command System (ICS)** as "a standardized approach to the command, control, and coordination of on-scene incident management that provides a common hierarchy within which personnel from multiple organizations can be effective." The NIMS approach is scalable and works across industries. A discussion of ICS for utilities is here. There is ICS training available at several levels. ICS 100 provides a baseline level.

1. Before a substation fire occurs, establish a working relationship with local fire departments. Discuss the hazards present in substations and exchange information on how to address substation fires. This document can be a starting point for that conversation.
2. In the first case study, the protocol for assuming the Incident Commander role, as outlined in the company's fire entry procedure, was not clearly understood by some of the utility personnel who were present and responded to the incident.
   a. **Emergency Notifications:** Even though the station may be equipped with central station monitoring, the generic notification to the fire department does not properly prepare them for the conditions they may face.

i. The first person to discover a fire is responsible to report it via 911 regardless of any central station monitoring that may be present (this is often a local law). Verbal notifications can convey actual conditions and the number of personnel present whereas central station notifications to 911 are generic. The 911 call from personnel at the site may provide information on what is fire, whether a hazmat company will be needed, whether specialty apparatuses (e.g., a foam tender) will be needed, or whether an ambulance needed (note that many locations automatically dispatch one with the fire dispatch). 911 call minimum content can be memorialized into a checklist and reinforced with training.

ii. Facilities that have central monitoring should have a sign stating words to the effect of: “The fire detection system in this station is centrally monitored. Any inspection testing or maintenance work on this system requires notification to the alarm company to prevent inadvertent dispatch of fire department. In the event of a fire, 911 must also be notified in parallel that there is a fire within the station.”

iii. All station fire alarms must be working to design criteria set forth under NFPA 72

b. **Incident Command:** In order to have the best alignment with first responders’ training and expectations (or to work across other industry interfaces in larger scale events) use the framework of the Incident Command System, which provides clear linear paths for communication that surround an organization chart. Entity personnel responding to a substation fire should be trained to the basic ICS 100 level.

c. **Predetermine an Access Plan:** Fire service personnel, in many cases, are not fully trained or prepared to deal with the electrical/industrial hazards found in a substation. Any entry into the station must have an escort; preferably a station operator who is capable of not only explaining the hazards but mitigating such hazards where applicable, such as performing switching.

i. Develop a joint access procedure with the local fire department. This should define who is authorized to provide an escort from the utility and a means to identify the utility representative in charge. The procedure should further define command and control steps for implementing ICS and assigning roles and responsibilities to meet incident objectives.

ii. A substation operator is likely to be the initial POC for the fire services until qualified management arrive on site; however, in the absence of an operator, the most senior personnel at the site should be the single voice for the company. Note: If the individual is not an operator, the discussion should be limited to personnel accountability and evacuation.

“The Hat” – Identifying the Point of Contact / Incident Commander: Some entities use a different hard hat color identify its POC/IC for first responders. Standard NIMS ICS vests can also be used. During an emergency, the station operator or senior personnel onsite don that different colored hard hat (and /or vest) to stand out from the other company employees. Through prior communication and training, members of the first response community have been conditioned to seek out the “Hat” on arrival to a substation emergency. In addition, the fire services are clearly instructed NOT to take any tactical direction from anyone unless they are wearing that color of hard hat. Entity personnel should be trained to direct all question from members of the first response community to the “Hat” and refrain from providing their own opinions to ensure there is one clear and consistent message.

iii. During an incident, at least one dedicated district operator should be assigned to the incident to expedite switch moves in support of mitigation and recovery efforts.

iv. If possible, the operations group should dedicate multiple transmission system operators for the duration of the incident. One operator can coordinate and communicate amongst the control center, works crews, and the incident commander. The second operator can handle logging of event times, issue work authorizations, deliver accident prevention tags, and make reports to the first operator. A third operator can assist with switching under the direction of the operator in charge.

v. The fire services should be directed to find a safe staging area until the arrival of qualified personnel who can direct tactical operations. The location of the safe staging area is defined by smoke or PCB inhalation hazard and the potential for secondary explosions.

vi. Remember, the fire department’s primary concern is life safety. Once all personnel have been accounted for the sense of urgency ramps down. Fire conditions and proximity to neighboring properties may cause the fire department to take defensive actions to protect these exposures. This is perfectly acceptable; however, they should be reminded that, during this process, water streams should not contact station equipment.

vii. Consider each mode of failure that could occur within a station along with the hazards that result. Discuss these with the local fire department to determine response tactics necessary for mitigation and any gaps in necessary equipment and resources.

3. **Forced Entry/Company Escort:** In most substation fire cases, personnel can be easily accounted for and whatever is burning cannot be saved. As such, there is no value in forcing entry to these locations. These are low frequency, high-hazard locations that should not be entered without an escort.

   a. Fire department personnel do not encounter enough substation incidents to sharpen their skill set to the degree they can operate within these facilities alone. Fire department members are escorted by the incident commander (See “The Hat”) or a fire brigade member designated by the incident commander if conditions require that level of PPE.

   b. Access Systems:

      i. Card readers that are used as the primary means of station access must be maintained in good working order.

      ii. Consideration should be given to the installation of a mechanical locking system for emergency access. As opposed to a traditional key access system, a push-button combination system would could be a viable alternative. The access code during an emergency could be obtained from the local control center and changed following an emergency to prevent bypass of card reader systems.

> **Alleviating Forced Entry:** Forcing entry into a staffed substation is a problem. Forcing entry to an unstaffed substation is a recipe for disaster. Condition your fire department to stay out and take defensive roles in protected exposures as need be.
>
> Substations in urban settings with discreet exterior facades need special signage: how does the fire department know that there is a high-hazard substation on the other side of the door? There is an entity that has arranged to use a sign on its doors that is a replica of the local fire department’s logo. This catches the attention of arriving fire department units and serves as a “STOP SIGN” cautioning against forced entry.

4. **Incident Size-Up:** On arrival, the incident commander should partner with the senior fire officer and conduct a size-up of the incident. The primary focus of the size-up is life safety. The central concern is not what's burning, but what's in service and being impinged by fire that can fail and injure employees and first responders. The first order of business is to evaluate equipment surrounding the fire in 360 degree pattern.

5. **Transformer fire contingencies:** If a transformer fire has been confirmed, the incident will span multiple operational periods. As such, consideration should be given to deploying basic equipment to the site even while the incident size up and needs assessment is being performed.

   a. As a priority, vacuum tankers and a frac tank (mobile liquid storage tank with a capacity of 20,000 gallons – vacuum tankers recover oil/water and send it to the frac tank). Light towers, bathrooms and a mobile office trailer may be needed.

   b. Consideration should be given to weather conditions. Transformer replacements usually come with a large staffing contingent. Tents with heat/ac work well for meals and safety briefings.

   c. A Transformer Fire rule of thumb – as you conduct the assessment, if you notice that the heat coming off the transformer is so intense it impacts your ability to walk through an area, then you should make a request to the fire services to set up a fog line between the transformer and equipment that needs protection. If so equipped, it may be prudent to set off deluge on adjacent transformers.

   d. A second consideration is the migration of flammable oil into trenches with control wiring. In addition to possibly shutting down station motor operated disconnects, it could cause motor operated disconnects to open under load.

Polychlorinated biphenyls (PCBs):
PCBs are toxic, may cause cancer, and were once widely used as dielectric and coolant fluids in electrical equipment. In 1979, the Environmental Protection Agency banned the production and importation of PCBs and has had rules for its disposal since 1978.

Large electrical equipment built prior to the 1979 ban may continue to use PCBs for the life of the equipment as long as it does not leak. Therefore, there are some installations where PCBs may still be found–not just utility owned, but industrial sites also (some were 'retired in place'). While these are generally older installations, reuse of older equipment at newer sites does happen.

>1 PPM / PCB's is a health hazard. In response, fire department personnel should wear structural firefighting gear and SCBA while operating at any utility fire where reasonable contact with smoke and liquid can occur.

For emergency response purposes consider all smoke and liquid above >1 PPM/PCB's.

6. **Command Center:** It is very useful to create a command center area with a way to map out and draw the station (use an easel, white board, tape paper to the side of a vehicle, etc.). The utility's operations group should provide the utility's incident commander of substation equipment fires to make sure that safety and the restoration of customer load are prioritized and not permanent repairs. Once a chain of command is established for all participating groups, the names need to be listed on an easel or white board at an established command center.

   a. Improve preparedness by installing a fire department lock box at important stations. The box should be mounted near the main exit of the facility where you would meet incoming first responders. Each lock box should have book which contains the following:

      i. Site plan: general equipment layout with entrance/exits, location of fire department connections and direction of grade for run-off of fire suppression agent

ii. Chemical/SDS data: Such as transformer oil, dielectric fluid, eidisol XT (cap bank), sulfur hexafluoride, sulfuric acid (station batteries)

iii. An aerial photo: To support staging of fire apparatus and identify potential areas that may need to be evacuated based on wind

iv. The highest station voltage and safe standoff distances for approach and the application of water based suppression agents: (examples)

(1) 138,000 Volts: 75’ Straight Stream – 15’ 30 Degree Fog

(2) 345,000 Volts: 125’ Straight Stream – 25’ Fog

v. A PCB Statement: indicating that all smoke and liquids should be treated as PCB’s until sampling is completed (unless absolutely known that none are at the station). All members exposed to smoke or liquids should be deconned

vi. One line drawing of the station (electrical print)

b. To ensure integrity of information within lock box have a key box mounted on lock box. Glass on key box must be broken to access key for entry to lock box.

c. Identifying tools, such as ICS vests and a hard hat, for designating the Incident Commander should also be placed in the box. This will help identify the IC (and other positions) to first responders.

d. It is possible to purchase a “field command post” package with white boards as described in NIMS. This will allow you to display your incident response organization chart and the laminated site drawing to identify affected equipment and the means of egress. The board should also have an area to capture incident status and goals, track assets, and keep a list of responding emergency personnel police/fire.

e. The incident commander should meet with all lead members to create a list of goals and priorities on a white board or easel. The incident commander should make sure that all group leaders provide updates as goals or situations change so plans can be updated at the command center for everyone to review.

Preparedness Drawings & Photos

The second case study demonstrated the importance of having a computer / tablet or photographs to display aerial views of the substation at the command center to help coordinate fire-fighting efforts with the local police and fire departments who were not familiar with the substation layout. It was also important to have a power system map to help illustrate the affected circuits during the outage to all participating groups. This information could be kept in the recommended “Lock Box.”

Temporary Station Power: In the first case study, the participating groups needed to use cell phones to communicate because the station phone system did not work when the substation DC was de-energized to save the batteries.

A basic response plan should be developed for substations in the event there is a loss of light & power that is also the charging supply for station batteries. The plan should outline generator size, cable size and sets per-phase, and the length of cables as it relates to point of connection.

Note: Load boards should be outfitted with tails that have phase indications, which is the most expeditious manner in connecting generator.

7. **Transformer and other oil fires:** Ensure a carbon dioxide (CO_2) or foam truck unit is dispatched to the substation in a timely manner.
    a. Not every fire department has CO_2 or foam trucks. However, if your department has the resources, this issue may be solved with scripted message during a notification to 911 for a fire that requests a foam tender for the fire services.
    b. Another option would be to purchase and store suppression agent at the substation
    c. Based on geographic locations of the stations, it may be more cost effective for entities to purchase a few foam trailers (see 'A Foam Initiative') that could be stored at entity facilities and towed out to a fire.
8. **Metal Switchgear:** The best immediate response tactic to an energized switchgear fire is to remove its power source. The station operator, not the fire department, will do that. Nearly everything is metal, so once the electrical source is removed, the fire usually goes out. Normally the only remaining isolated pockets of fire will be from burning insulation that can be suppressed with a CO2 extinguisher. These extinguishers are Class C rated and tested safe to 100,000 volts. If the switchgear was oil cooled or insulated, foam may also be needed.

A Foam Initiative:
Foam has the ability to quickly suppress the fire, cool substation equipment, capture combustion products and some oil. Its use reduces nearby equipment damage and contamination, environmental damage, and the time it takes for the facility to be remediated and recover from the fire. Many local fire departments do not have foam equipment and cannot afford it on their own.

How much foam is needed? Some fire engines carry 15-30 gallon of foam. There are formulas for how much may be needed. Use some face-to-face planning and Q&A sessions with the local fire department at important sites with large transformers and other oil-filled devices to determine the potential foam usage ahead of time, before you really need it.

One utility, recognizing the benefits of using foam over water, has taken the initiative to purchase and preposition "foam trailers" at several of its service centers. These are small trailers, containing 20 five gallon tanks of foam concentrate, an educator, hose, an assortment of the fittings required to use the foam with standard fire-fighting equipment, and an oil spill response kit. The trailer is towed by a utility pickup truck to the fire location for the fire department to use.

Photo credit Georgia Power

The utility driver may also provide necessary local switching and station access as well as coordinate communications between first responders and the utility.

Better than Foam?
There are firefighting copolymer gels that adhere to objects they are sprayed onto and can hold hundreds of times its own weight in water, making it able to absorb much more heat than foam. Not only can these be used suppress fires, these gels can be sprayed onto nearby structures and equipment to prevent fire spreading to or damaging them.

However, these gels cannot be used on class B fires; they sink due to weight and may raise burning oil above the edge of a berm, encouraging spread. Something like foam must be used as it floats on the surface of the fuel and smothers the fire.

Advice from an expert trainer to first responders:

1. **Transformer fire suppression is two-step process**: You must capture the main body of fire on top of the unit then conduct the 360 degree assessment of the bank with a thermal imaging gun to identify isolated pockets of fire remaining within the bank. Most think transformers are reigniting when in fact the fire was never fully extinguished during the first attempt.

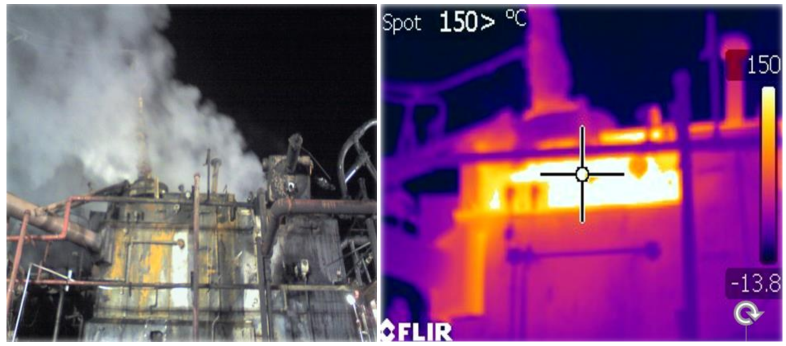

Photo Credit Anthony Natale / Consolidated Edison

2. **Switching:** The automatic opening operation of breakers on the high and low sides of the transformer should be confirmed. If at all possible, breakers should be blocked open. Isolation and grounding is not required to begin suppression operations. Suppression operations should consider a safe standoff distance based on contact voltage, a fog pattern that will eliminate leakage, a suppression agent low in conductivity, and a maximum induction pressure of 125 psi. Following that process, you would be able to hit a live conductor if overspray should occur or should a breaker reclose without adverse effects to the firefighter on the nozzle. Note: In most cases of catastrophic failures, the high and low sides are burned clear, islanding the bank so isolation and grounding is not feasible.
3. **Leakage to the Nozzle:** This refers to current flow back to the firefighter holding the nozzle during suppression operations. This process is directly influenced by the three P's. Pattern, product, and pressure.
4. **Pattern:** As you open the stream, the space between the water droplets increases and diminishes the currents ability to travel back through the stream to the nozzle. The most appropriate is a 30 degree fog pattern or power-cone.
5. **Pressure:** Increasing pressure increases conductivity. Most foam operations use 95 or 125 psi systems. Do not exceed 125 psi.
6. **Product:**
    a. **Water:** Never use water on a class B fire; based on its specific gravity, it will sink below the high-temperature transformer oil that is above the boiling temperature of water, causing a phenomena called a "boil over." This condition is NOT survivable. You will also lose the station due to rapid fire spread.
    b. **NFPA Agents:** Consideration should be given to using NFPA 11 foams or NFPA 18 water additives that can be delivered in a fog pattern. Certain foam products require a special applicator nozzle that delivers the product in a straight stream, which increases conductivity. Do not use any agent that must be delivered in this manner.
    c. **Dry-Chemical:** Most dry chemicals, such as purple-k, have a Class C rating, so they are safe to use in electrical environments. However, these agents offer no cooling value. The fire causes heat retention in the metal of the transformer, keeping the oil above its auto-ignition temperature. This makes these types of fire very persistent without the ability to cool the bank.

   d. **Drafting:** In locations where hydrants/potable water do not exist, the fire services will draft from nearby water bodies. Salt water is EXTREMELY conductive and NOT recommended to be used with foam products. In addition, drafting from fresh water sources has never been evaluated. High mineral content may also increase conductivity. In locations with viable hydrants, a tanker task forces concept is recommended.

7. **Safe Standoff Distance:** The use of a fog pattern will allow you to reduce the standoff distance to the distance used for electrical contact. If the shape of the stream is narrowed, then leakage must be compensated with distance.

8. **Electrical Test Standard:** To determine if the product you intend to use is safe, use the test guide found in NFPA 18a – chapter 8 Section 8.5.

Fire Service Response Posture

- **Entity and Fire Department Preplanning**
    - Identify every failure scenario and work with the fire services to discuss the hazards and appropriate response tactics for each scenario
    - Memorialize these into a policies internally and externally. Policies should complement each other. These will also serve as the basis for training company employees and department personnel.
    - Develop critical information data sheets for each substation. This is basic information first due fire companies need on arrival this will define their initial action and behavior. In example: XXXX Substation – do not force entry – wait for the "[xxxx color] Hat" - 138,000 volts – consider all smoke and liquid to contain PCB's – do not raise tower ladder. 24 Hour control center number xxx-xxx-xxxx
    - Conduct familiarization tours with fire services.
    - As a result of familiarization, tour assist the fire company in developing a site-specific pre-incident guide. This will be used by chief officer during an incident to drive decision making.
- **Response**
    - DO NOT force entry.
    - Stage all fire apparatuses one block away. Staging should consider the hazards of smoke/ PCB inhalation and the potential for secondary explosions.
    - Go to the established meeting place and a utility rep will meet you there. DO NOT go to the fire area.
    - Utility personnel should obtain information from the "lock Box" and meet the fire department at a predetermined location to discuss the incident.
    - Have fire services take defensive action in protecting against fire. Communicate to neighboring properties if applicable.
    - Conduct a scene size-up with chief officer or their designee.
    - Identify alternate means of egress to support back-up evacuation plan if there is rapid fire spread.

- Capture and extinguish the main body of fire on top of bank.
- If applicable, conduction switching in parallel to isolate and ground equipment; the success path is to turn a class B/C fire into an easier to extinguish class B fire.
- Shoot the bank with a thermal imaging gun to identify isolated pockets of fire within.
- Use a tower ladder to drop 90 degree spray nozzle or Bresnan distributor into the primary or secondary bushing ports to extinguish isolated pockets of fire interior to the bank
- A vacuum truck should be recovering oil water run-off during suppression operations.

Photo credit Georgia Power

First Responder reviews and inputs to this document were provided by members of:
The International Association of Fire Chiefs (IAFC), and The National Volunteer Fire Council (NVFC)

Click here for: Lesson Learned Comment Form

For more Information please contact:

NERC – Lessons Learned (via email)	WECC Event Analysis
Source of Lesson Learned:	WECC
Lesson Learned #:	20190202
Date Published:	February 26, 2019
Category:	Transmission Facilities, Generation Facilities

This document is designed to convey lessons learned from NERC's various activities. It is not intended to establish new requirements under NERC's Reliability Standards or to modify the requirements in any existing Reliability Standards. Compliance will continue to be determined based on language in the NERC Reliability Standards as they may be amended from time to time. Implementation of this lesson learned is not a substitute for compliance with requirements in NERC's Reliability Standards.