



Engineering & Operations Committee

# Overview of Arc Flash Safety Planning

Item 6a

April 11, 2022

# Electrical System Background



*Staff performing electrical maintenance on 230kV circuit breaker*

Safe, reliable power is essential for treating and delivering water

- Metropolitan has electrical infrastructure at 5 treatment plants, 15 hydroelectric plants, 7 pumping plants and numerous turnouts and pressure control structures
- Metropolitan has over 1,000 electrical systems from 480 volts to 230,000 volts
- Metropolitan has a strong and well-established safety culture and program

## What is Arc Flash?



*Switchgear undergoing arc  
flash testing  
(Stock image – Not a  
Metropolitan facility)*

Arc flash is the explosion or flashover of electric current traveling through the air similar to the energy of a bomb blast

- Serious injury and property damage can result from arc flash events
- Arc flash is governed by electrical codes, standards, and regulations which are constantly evolving
- Recent regulatory changes require additional analysis of arc flash hazards
- Metropolitan's electrical safety program must evolve with these industry trends



## Arc Flash Safety at MWD



*Photo from 1978 Eagle  
Mountain arc flash incident*

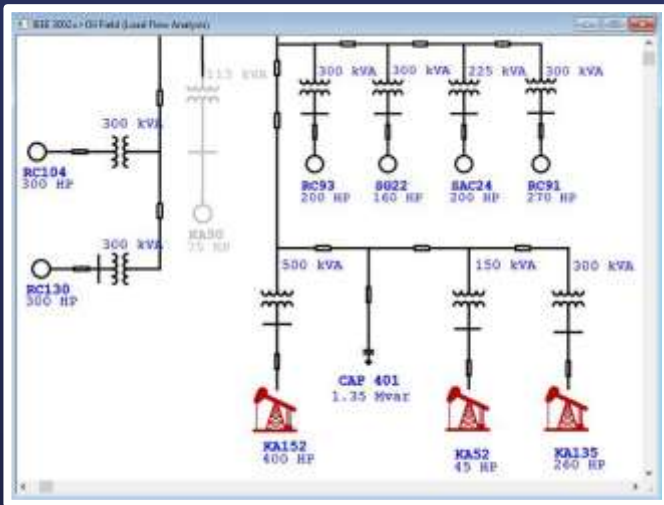
## Significant arc flash incident occurred in 1978 at Eagle Mountain Pumping Plant

- Led to Metropolitan centralizing electrical safety and other procedures through the development of System Operating Orders Manual (SOOM) in 1979
- Metropolitan evolved and developed a Health Safety and Environmental (HSE) Manual section based on National Fire Protection Association (NFPA) Standard 70E
- Arc flash studies are required to be reviewed every 5 years by NFPA 70E

# Arc Flash Studies

Arc flash studies are required to assess hazards and conform to best practices including:

- Gathering all electrical system data and field verifying for accuracy
- Modeling collected data in software
- Having a qualified professional engineer perform an arc flash hazard analysis
- Creating and applying arc flash hazard labels on field equipment to enhance worker safety



*ETAP power system analysis software single line diagram*

## Arc Flash Benefits



*Switching at Venice (HEP)*

Performing arc flash analysis provides numerous operational benefits and safety improvements:

- Identifies areas with highest safety risk
- Ensures protective devices are properly configured to work as needed
- Ensures electrical drawings are up to date and accurate
- Front-end engineering of capital project effort is reduced
- Enhances employee safety and reduces the risk of operational upsets

# Arc Flash Safety Planning Summary



*Staff racking out circuit  
breaker at Corona HEP*

- Arc Flash Study will require significant resources and planning
- Metropolitan has a large geographical and electrical system footprint
- Metropolitan has a history of a robust electrical safety program
- Electrical Arc Flash is a serious hazard and exposure varies significantly based on specific installation details
- Existing arc flash hazard labels and arc flash studies required to be reviewed every 5 years



# Arc Flash Safety Planning

## Next Steps



*Staff isolating equipment for maintenance at Skinner WTP*

- Performing arc flash analysis at all Metropolitan facilities will be a multi-year effort
- Staff will bring an action on this effort in the near future for Board consideration
- Arc flash analysis may lead to:
  - Improved safety procedures
  - Minor or major capital projects to improve system safety and reliability
- Staff are benchmarking arc flash hazard analysis strategy with other agencies



