THE INTENT OF TODAY'S MESSAGE IS TO HAVE AN OPEN CONVERSATION. THIS IS NOT A LESSON ON NFPA, TJC OR STATE REQUIREMENTS (ALTHOUGH MUCH OF IT IS REQUIRED BY ALL). EVERYONE IN THIS ROOM IS WELL AWARE OF CODE AND REQUIREMENTS. WHAT WE ARE SHARING IN THIS PRESENTATION COMES FROM YEARS OF EXPERIENCE THAT'S NOT WRITTEN IN A BOOK.

DON'T THINK THIS CAN HAPPEN TO YOU? WELL IT HAPPENED TO SOMEONE!!
HOW DO YOU MITIGATE THE RISK OF EXTENSIVE EXPOSURE IN THE EVENT YOUR FACILITY EXPERIENCES A FAILURE OF THE EMERGENCY POWER SYSTEM?

1. Have a thorough knowledge of the capabilities of your emergency power equipment.
2. Make sure your facility management understands the limitations of the emergency power system.
3. Understand how the emergency system operates...whole picture.
4. Identify system “gaps”.
5. Execute a plan to correct these “gaps”.

HAVE A THOROUGH KNOWLEDGE OF THE CAPABILITIES OF YOUR EMERGENCY POWER SYSTEM.

A. What equipment is supplied by emergency power?
B. How long can you supply emergency power with onsite stored fuel capacity? Make up oil? Coolant if needed...
C. How many hours before service is required and how will the down time be handled?
D. Prepare for system failure...

UNDERSTANDING HOW THE EMERGENCY SYSTEM OPERATES AS A WHOLE

DC Control System

1. Engine controller
2. Batteries
3. Battery charger
4. Starter
COMMON FAILURES

- DC Starting System
  - Batteries
  - Age and condition - NAPA recommends lead acid batteries be replaced every 3 to 5 years
  - Cables
    - Ensure cables are properly sized and in good condition
  - Connectors
    - Ensure connectors are tight, free of rust and no corrosion are terminals are free from corrosion
  - Stator
    - Test stator, if a pull test they need to be tested independently of each other. Ensure that each stator will turn the engine
  - Start Solenoid
    - Same as with starter, test each start solenoid independently of each other

UNDERSTANDING HOW THE EMERGENCY SYSTEM OPERATES AS A WHOLE

FUEL SYSTEM
1. Main Storage Tank
2. Day Tank
3. Transfer Pumps and Solenoids
4. Manual Pumps and Bypass Circuits
5. Fuel Filters and Water Separators
6. Governor System

COMMON FAILURES

- Fuel System
  - Check filters - Make sure you keep your filters clean. Ensure you always have extra sets of filters onsite.
  - Drying filters and a fuel delivery system in fuel in an emergency. This is not easy and the quality of it is poor. We need common filters every ten minutes.
  - Fuel quality test - Testing should be performed annually.
  - Is the engine air clean? If your fans are clogged with soot or the oil is often leaking and replaced. Test motors. If the water cooling system with the stagnant water for long periods of time, spin how we would. Make sure the engine is not damaged. If you can see a fire in the engine, you can start the engine.
  - Fuel filters - replace the filter. Check the condition of the fuel filter. If it is damaged, replace the filter. Internally damaged filters can not be seen from the outside of the filter.
UNDERSTANDING HOW THE EMERGENCY SYSTEM OPERATES AS A WHOLE

COOLING SYSTEM
1. Radiator + Core Mounts
   a. Belts
   b. Pressurizers
   c. Horse and Clamps
   d. Level Switches
2. Radiator + Coolant System
   a. Electric Supply
   b. Control
   c. Valves, Hoses, Clamps
   d. Level Switches
3. Type of Coolant and Additives
4. Capacity

COMMON FAILURES
- Cooling System
  - Leaks
  - Ensure the coolant is maintained at proper level at all times
  - Condenser
  - Ensure the coolant circulation is directed to an adequate flow
  - Hoses
  - Check all cooling coolant hoses for cracks and communication
  - Radiator
  - Make sure the radiator core is clean and free from debris
  - Contact the manufacturer for correction

UNDERSTAND HOW THE EMERGENCY SYSTEM OPERATES AS A WHOLE

AIR SYSTEM
1. Intake for Cooling and Combustion
   a. Louvers + Fixed
      1. No obstructions
   b. Louvers + Moveable
      1. No obstructions
   2. Control + Air or Electric
   2. Exhaust fans for removing heat
      a. Adequate air movement
      b. Clean radiator core
UNDERSTANDING HOW THE EMERGENCY SYSTEM OPERATES AS A WHOLE

**Exhaust System**
1. No blockage
2. No slobber conditions
3. Insulated properly
4. Roof and wall penetrations
5. Raincap or bird screen
6. No holes or rust

**Automatic Transfer Switches**
1. Types
2. Quantity and rating
3. Number of poles, switched neutral grounded
4. Normal, emergency, and load labels

**Common Transfer Switch Failures**
- Control panels
- Transfer switch control contact
- Operator coils/motors
- Low voltage
- High voltage
- Human error
- Heat stress due to poor connections or lack of maintenance
UNDERSTANDING HOW THE EMERGENCY SYSTEM OPERATES AS A WHOLE

**Paralleling Switchgear**
1. Number of generators and rating
2. How loads are prioritized
3. Breaker operation
4. Controls and indicators

MAKE SURE YOUR FACILITY MANAGEMENT UNDERSTANDS THE LIMITATIONS OF THE EMERGENCY POWER SYSTEM

A. Review with each department head how their department and staff will be affected
B. Perform complete utility outage as a disaster drill
C. Conduct a post drill review with department heads

PORTABLE RENTAL EQUIPMENT

How many of you have seen one of these roll in to be connected to your facility?
FALSE SENSE OF SECURITY?

• When it arrives, instant do you feel better?
• Rental units travel from site to site often without being tested or maintained.
• Once a portable is brought onsite you should consider having your EPS provider go through the unit to check it over thoroughly.
• In an emergency situation we understand this can be a difficult task. You have administration or your back wanting to know “are we back up”. Your vulnerable to a power failure. Of course you want your servers quick but do you want it, just say yes, walk away and find out later it couldn’t run for an hour without presenting an issue that could have been spotted prior to connecting it to your facility.
• Once this has been completed to your facility to now requires your “Emergency Generator”. Of course this could be your only source of power and should be treated as such.

HAVE A PLAN OF ACTION IN PLACE

• If my emergency generator fails, am I prepared?
  • Do I have a vendor that can supply me with the unit properly sized to my facility?
  • Do I know the best way to connect it to my facility?
  • Portable generator connection box. Portable connection boxes are a great way to quickly get an EPS connected to your facility.
  • Additional benefit - they can often be used as a place to tie in your own annual testing without interrupting the ability to still have UPS/RTU work
• Do I have a pure delivery plan in place?

OBSERVE

1. Ask yourself – Is this adequate?
2. Is this obsolete?
3. Do I need a back up?
4. Will I need additional staff?
5. Will outside help be necessary?
6. Does this work correctly?
REPAIR/REPLACE

1. Repair malfunctioning components
2. Replace obsolete component
3. Modify inadequate subsystems
4. Replace critical indicator lamps with LED type
5. Remove unrelated items in area - housecleaning!
6. Redundant supplies

DESIGN

1. Provide permanent load bank / rental outside connection box with start control circuit
2. Prepare to supply "normal only" circuits with portable (generator)
3. Install more elevators, air handlers, and chillers on emergency power
4. Design for reliability and ease of maintenance
5. Establish your own emergency system design criteria
6. Inspect against "safety engineered savings"

ENCOURAGE PARTICIPATION

1. Look to all of your staff for input
2. Inform all other vendors for input
3. Encourage staff to report any deficiency in system
4. Reward good input / suggestions
REMOVE ANY DOUBT

1. Educate your staff in complete system operation
2. Test your staff regularly
3. Educate all facility management in system capabilities
4. Educate all department heads in system capabilities
5. Review with risk manager regularly

I HAVE A GREAT EPSS PROVIDER, DO I REALLY NEED TO KNOW ALL OF THIS?

* There will come a time when you are on an “island” - no outside help can get there timely and everyone in your facility will be looking to you for answers.
  * Hurricane
  * Flooding
  * Fire
  * Etc. Traffic
IN CLOSING
TESTING...KNOWLEDGE...PREPARATION...EXECUTION