

# Roundtable roundup

Industry experts exchange ideas, trends during discussion on emergency power

## WHEN A HEALTHCARE FACILITY LOSES POWER,

it loses its ability to fulfill the very core of its mission—to care for patients. And in the event of an emergency or natural disaster, a facility becomes much more important—providing shelter to the local community.

As such, nine industry experts recently gathered to discuss emergency power for healthcare facilities. Issues addressed included the design, construction, commissioning, operation and maintenance of emergency power systems; the growing need for higher power reliability; the costs of interrupted power and practices for monitoring and controlling increasingly sophisticated power systems.



This article provides highlights of the discussion and is part one in a two-part MCD exclusive series. The discussion was organized by ASCO Power Technologies and moderated by MCD magazine. Part two will appear in the January/February 2012 edition of MCD.

## MCD: How is digital healthcare affecting emergency power systems in healthcare facilities?

**Hungerford:** At Fred Hutchinson Cancer Research Center, and this was a little before my time, the very first server room we had was for digitizing healthcare records. With patient records, protocols and so forth, there was no way to search this data and retrieve it quickly, so they made this a priority and set it up. At the time, it was fairly innovative and it's been, of course, a terrific boon.

The data centers that support what we do have gotten larger. The expectation that it's going to be always ready, never corrupted, never go down is a cornerstone of how we do it. Our clinic is a very busy outpatient clinic, and there, too, I see the same expectation of reliability for how they do their work. Everything is built toward never, ever going down. That's the data center side, and then the digitization of how they intake patients, how they move them from one specialist to another and keep those records moving with

## EMERGENCY POWER FOR HEALTHCARE FACILITIES PANELISTS

- James A. Brownrigg**, vice president, Healthcare, Turner Construction
- Jonathan L. Cadd**, education code and standards coordinator, seminar specialist - technical editor, International Association of Electrical Inspectors
- Daniel J. Caron, P.E.**, LEED AP, principal, Bard, Rao + Athanas Consulting Engineers, LLC
- Jim Degnan, P.E.**, LEED AP, principal, Sparling
- Jose J. Fernandez, P.E.**, electrical engineer, US Army Corps of Engineers
- Mark Hungerford**, lead electrical operating engineer, Fred Hutchinson Cancer Research Center
- Dan Michalak, P.E.**, manager, Electrical Engineering Services, Sr. electrical and fire protection engineer, University of Nebraska Medical Center, Facilities Management & Planning
- Todd Wilkening**, CHST, director, facilities, Ridgeview Medical Center, Minnesota, vice president of IFMA Healthcare Council
- Dawn Willey**, director, facilities, Benefis Health System

the patient throughout the day, that has become more critical.

**Willey:** We have all of that in place. We reassured our information systems people they are going to run if we lost power. We proved it to them several different times. What ended up happening is they lost the main server for our patient documentation system, hence they had power but they didn't have a server. So, for 24 hours, we reverted to a paper system. The interesting thing is many of our staff had never documented on paper, so we ended up doing a quick training for staff, nurses in particular, on how to document. So it's not always about the emergency electrical supply, which is what they were focused on... that and cooling. Will you always be able to cool us? Yes. But now they have put into place procedures that if they lose a critical server, they're not down that long. But it was an interesting learning experience because everybody had forgotten how to document on paper.

**Michalak:** From electrical code compliance though, it really raises a number of questions. If you have electronic paperless records, or you're in an OR and you have a flat screen TV that displays medical records and vital statistics, Article 517 [NEC] breaks up the essential emergency electrical system into multiple branches. There may be optional standby branch, life safety branch, critical branch, equipment branch and a legally required standby branch. In our large campus setting,

our data center is located offsite from the hospital. It's on our campus but it's not in the hospital per se. So, in this particular case, our data center was in business occupancy. As far as the data center itself, that would be classified as optional standby branch. So now you have medical records, which you would think would be critical branch or life safety branch or equipment branch. The reality is, that data center, is on optional standby from an electrical standpoint. But you're running all sorts of different scenarios, especially when you have the electronic paperless records and you're at access points throughout the facility. With some of the outside business occupancies, all you have is a life safety branch or an optional standby branch. You don't have a critical branch. So it brings up a number of code issues, especially Article 517. Emergency power is not just emergency power. You've got to look at the right branch of emergency power.

**Cadd:** That brings up a good point, especially when you talk about critical data beyond an optional standby system. In the point we just heard, this could very well be designated "Critical Operations Data," particularly when we get into Article 708 and now it's Article 645 that kicks in. We're talking about these critical operations data systems that hold all types of information critical to patients, procedures, operations, etc. If a facility is designated as a vital infrastructure facility, there will be ties

into Article 708 for our Critical Operations Power Systems (COPS), which changes the hierarchy. Because now, we have our Critical Operations Power Systems and our emergency systems, both designated as the number one power sources in order of importance. NEC Article 708 says I've got to keep my critical operations power systems running, and it also says in 708.22, for an unlimited number of hours. Only during times of maintenance can we take that system down and guarantee 72 hours from an alternate power source. Inspectors don't typically deal with

this type of thing when they're on the job. They're looking at a set of plans, specifications.

**Wilkening:** Does 708 understand the difference of critical data systems as it relates to sustaining life or is critical data to manage patient care? Because I see a difference in the 'sustain life' versus 'management patient care.'

**Cadd:** That's a great question, because if you look at it from the inspector's standpoint, it's life safety, pure and simple. Typically, you're not going to have JCAHO and HIPAA, as those are generally foreign to

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day-to-day inspectors. An inspector gets on a jobsite, and they look at 708 and they're thinking life safety. At the end of the day, from an inspector's standpoint, if I get everybody out of this building, have the required emergency power systems, along with required battery back-up, on life-sustaining systems, the building will take care of itself. If something happens to the building, insurance will take care of that. But it's pure lifesaving, getting bodies out of that place and making sure they're safe from an inspection standpoint.

is fairly new to the National Electric Code, and that is sustaining critical operations, not getting people out of a building. And that critical operation or process may be defined by the owner in their choice of looking to comply with Article 708. Although 708 references hospitals as one of the types of facilities that would consider using it, the intricacies of applying 708 to a hospital are actually fairly prohibitive because it requires defining a critical operations area within a facility. And in a hospital, all of the support mechanisms are interlocked so the whole building becomes a critical facility.

**Wilkening:** As a facilities director, the critical branch is first because that's serving airway, breathing and circulation; it's life or death. Critical power branch are systems that can create huge risk issues to the patient and then life safety.

**Michalak:** One of the underlying questions is, when you go to electronic paperless records does a data center in a business occupancy that is relatively off campus, or on the edge of campus, that is served by an optional standby system, now become an Article 708 critical operations facility beyond NFPA 75 requirements of a so-called information technology system? There are a number of codes and standards that could apply. So when somebody wants to connect emergency power, what does that really mean? The snowball effect, cost implications and logistics of doing that could be huge.

**Fernandez:** One of the things that has to be looked at

is events like Hurricane Katrina that lasted an extended period of time. I don't think any code was developed for applicability over 72 hours, like the field capability of diesel generators. Katrina lasted much longer and the horror stories that came out of some of the hospitals, wow. How are we addressing that as a community?

**Wilkening:** One of the challenges is that hospitals seldom forget they can also become victims in times of disaster. What do you do to provide patient care when you're the victim as well? That needs to be understood extremely well.

**MCD: Let's talk about monitoring emergency power systems and the ability to remotely monitor.**

**Michalak:** At our campus we do not use the generator start signal from transfer switches to start the generators. We monitor the status of the 4160 volt generator buses, and if they're hot we're good. If they're not, then generators start. But, in general, as far as each automatic transfer switch on campus, which we probably have over 120 of them now, we just monitor which position they're in. If they're in normal position or emergency position, then we have just the generator start contacts. But right now we are not using that generator start signal to start the generators.

**Degnan:** Generator suppliers can provide a digital status announcement of your generator system, so can your transfer switches, which can be linked

to a server, can have Web access. Anyone with a browser can pull up that website and put the passcode in and find out the status of their e-power system. We're seeing a lot of facility directors take advantage of that technology.

**Wilkening:** That's been really helpful for us. One of the things we tried to do but ran into barriers was supply some limited control of the generator. And we ran into problems: UL listing and warranty conflicts. It's strictly just a monitoring tool but it is web-based.

**MCD: For those that cannot be fully backed up, what are the obstacles? What are the drivers for what goes and doesn't go on emergency power?**

**Willey:** One driver to add equipment is if you are the sole provider in a 200-square-mile area, you do it. We also support a military base from a hospital standpoint. So that's one of our drivers.

**Wilkening:** Historically, if we were on limited power due to a main power system failure feeding a hospital, our surgery department would shut down all surgicals that weren't considered urgent and that would cause a huge backlog due to rescheduling surgicals. That would mean staff was standing



around doing nothing. Understanding the cost of not doing business and why we needed a fully redundant hospital is why I interviewed a surgical director. I had no idea that from a lost-revenue perspective for our hospital it was \$17,000 per

just had an explosion and is wiped off the planet. What do you do then? It's another classic case of meeting codes versus the logistics of it. Picture a 300 kW generator on a trailer, which is a fairly good size, and a 1-ton vehicle to



pull it. Think of the logistics of it. The generator is parked behind the central utility plant. So if the central plant is gone, the emergency generator is probably gone with it. But then in an emergency,

OR per hour. And when you add that into the equation of risk aversion to the cost of not doing business, and that's not counting soft costs inside the hospital, such as staff standing around doing nothing, it really adds to the business case very rapidly. We also interviewed our emergency department, our NICUs. When these people feel a power loss, their lives are in chaos. We've got to think how to use that paper and pen again. That's the real world and people don't want to live that. They want to do the right thing.

you have to find your grounds crew guy with the keys to the truck to drive the vehicle a mile down the road to this facility and pull it up to the dock. Then where are the cables for it? They say, oh, the cables were stored inside the vault at the central utility plant, which is no longer there. So now what do you do? In that case, your only resort is to call a generator supply company and rent cables as quickly as possible. But that will probably take several hours because of whatever other emergencies are going on. So does it meet code? Yes. Does it meet the federal mandate? Yes. But logistically, would it work?

**MCD: Is anyone using a portable generator as back up?**

**Michalak:** We have a portable 300 kilowatt generator, but that's for a federally mandated facility. We have a lab on top of one of our research facilities and the federal government requires us to assume a condition where neither normal nor emergency power is available. They say, assume your central plant

**Hungerford:** We have one, too. We have the bigger truck, a fuel delivery truck and cables, which are on reels that we built. We're not required to have it, but we have a very large freezer facility with samples, which if they go, they're gone for good. We run drills with it with a stopwatch. We found the cables were so

heavy that one man would probably, especially if he was under stress, have a heart attack trying to deal with it. We built reels small enough so one guy could move them and roll the cable out by himself, until he got some help. It's not enough to just own the equipment. You really have to think it all the way down the line to...can that engineer in the middle of the night make it work? I'm also somewhat skeptical but I'm very glad we have it.

**Caron:** Most of the designs we do on a new facility have a connection from the generator switch gear to a box outside

the building where one can plug in a load bank for the JCAHO testing, and it can also be used to back feed the system from a portable generator.

**Hungerford:** Very good idea. To dovetail into what you were saying about the construction process...A lot of times maybe they can't afford the second generator. But it might make sense to provide room for it, or make sure the switchgear is big enough. Let's make sure there's a breaker space in the emergency board. We won't buy the breaker now, but there are things that can be done to make adding it easy later. ■

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