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Engineering
3RD QUARTER 2011
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NEGOTIATING RISK ALLOCATION in Design Services Contracts

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By James F. Lee, Jr., Esq., and Michael F. Germano, Esq., Lee & McShane

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SFPE

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From the TECHNICAL DIRECTOR

The SFPE Educational and Scientific Foundation

The SFPE Educational and Scientific Foundation is the charitable arm of the Society of Fire Protection Engineers. Registered as a charitable ("501(c)(3)") organization in 1979 in the United States, the Educational and Scientific Foundation was created to:

- Receive and administer funds for scientific, educational and charitable purposes
- Support and encourage scientific research and education relative to improving the safety of life and property from fire

The bulk of the Foundation's grants have supported student research. This type of support fulfills both the educational and scientific purposes of the Foundation. However, the Foundation has also supported work by practicing professionals – generally in the form of financial incentives to write fire protection engineering textbooks.

The Foundation has supported more than 25 student research projects at 13 universities in six different countries. These have included graduate research that was conducted as part of master's thesis or doctoral dissertation work. Several of the students whose work was supported by the Foundation subsequently accepted teaching positions at universities that have academic programs in fire protection engineering. By funding this work, the Foundation has helped create the professors that will educate the next generation of fire protection engineers.

The Foundation has also supported development of reference books that are used in the fire protection engineering profession. These have included Babrauskas' *Ignition Handbook*, which is arguably the most comprehensive reference on a single subject in the fire protection literature. The Foundation has also supported Yung's *Principles of Fire Risk Assessment in Buildings* and Quintiere's *Fundamentals of Fire Phenomena*.

One of the greatest challenges facing the fire protection engineering profession is the small number of academic institutions that offer formal degree programs in the discipline. The Foundation has recognized the value of the budding fire protection engineering program at California Polytechnic State University, and has provided direct financial support.

The Foundation also funds a monetary award for the best paper published each year in the *Journal of Fire Protection Engineering*. Recently, the Foundation has begun sponsoring an annual Student Scholar award, which provides an honorarium and opportunity to present exemplary student research at the SFPE Annual Meeting. The Foundation has also supported development of a collection of "heritage documents" – these are key publications that provided the underpinning of the fire protection engineering profession. (The "heritage documents" are freely available to SFPE members on the SFPE website.)

Collectively, the Foundation's support of student research and the development of reference books have helped to advance the fire protection engineering profession. In the process, the Foundation has also provided valuable financial support to students.

However, despite the valuable support that the Foundation has provided, most SFPE members are unaware of the Foundation's work. A survey conducted earlier this year showed that a majority (54%) of SFPE members were unaware that the Foundation existed. Accordingly, only 15% of SFPE members have ever contributed to the Foundation.

The Foundation's funding has generally come from three sources: contributions from SFPE members, contributions from SFPE chapters and contributions from corporate sources. The annual dues invoice that SFPE members receive has a line for voluntary contributions to the Foundation. Chapters that wish to support the Foundation are given the opportunity to present their contributions in front of their peers during SFPE's Senate meeting, which is held during the Annual Meeting in October. Anyone can contribute to the Foundation at any time via the SFPE website. Doing so helps sustain the goals of the Foundation and supports the long-term viability of the profession.

Morgan J. Hurley, P.E., FSFPE
Technical Director
Society of Fire Protection Engineers

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Dear Editor:

Regarding the article entitled *"Fixed Fire Fighting Systems in Road Tunnels,"* 1st Quarter 2011, I strongly disagree there is a general negative viewpoint at using Fixed Fire Fighting Systems (FFFS) from decision-makers. FFFS are being installed in the four tunnels of the Presidio Parkway Project, which is the southern approach to the Golden Gate Bridge in San Francisco, CA. FFFS are planned to be installed in the new Midtown Tunnel between Portsmouth and Norfolk in Virginia as well as the new Port of Miami Tunnel currently under construction. In addition, FFFS are being installed in tunnels in development in Seattle, Washington. In Europe, FFFS have been or are being installed in the A86 Tunnel in Paris, the Channel Rail Tunnel between UK and France, the New Tyne Crossing in the UK and the M30 in Madrid.

Two recent fires contrast the effectiveness of FFFS. The Santa Clarita fire in California involved 30 vehicles and lasted 24 hours. Repairs took a month. In contrast, the Burnley Tunnel fire in Australia initially involved three vehicles, similar to Santa Clarita, and was controlled by its FFFS. The Burnley Tunnel was back in service in four days. The ability to minimize damage and have a rapid return to service is extremely attractive to decision-makers both from corridor availability and, where applicable, revenue generation.

Secondly, a primary objective of these systems is cooling of surfaces to minimize structure damage and to prevent the spread to other vehicles, thus limiting the damage. Suppression and control, while desirable, may not be possible, especially if the fire is shielded from the water spray. Nevertheless, benefit can still occur. Mist systems, which have been advertised for road tunnel use, are often described as preventing spread.

Third, the article did not mention the test conducted in the Second Benelux tunnel, which demonstrated the effectiveness of standard drop spray systems. Standard drop systems are extremely common and their installation and maintenance requirements are very well known in the fire protection industry. As alluded to in the article, research, including that conducted by my colleague Bob Melvin, has shown that standard drops give better penetration into the seat of the fire, especially the large solid fuel fires that account for the bulk of tunnel incidents.

Generally, previous industry reservations about FFFS have been shown to be unfounded. Annex E (E.3.2) of the referenced NFPA 502 specifically recounts the concerns and how those concerns have been generally dismissed as legitimate enough to dismiss consideration of FFFS application in many road tunnels.

While the author may not have had access to the Proceedings of the Fourth ISTSS held in March of this past year, I presented a paper on parametric water application rate effectiveness. Magnus Arvidson of SP presented one showing tests of FFFS standard drop and mist systems that qualitatively supported my analysis.

Sincerely yours,
Kenneth J. Harris, P.E.
Parsons Brinckerhoff

Author's Response

Dear Mr. Harris,

I would like to recommend that you read the full report. Perhaps it will give you a more nuanced account of the subject than the shorter article that I wrote. The report can be downloaded from *http://epubl.ltu.se/1402-1552/2009/113/LTU-DUPP-09113-SE.pdf.* The work presented in the report was supervised by Haukur Ingason and Magnus Arvidson, both working at SP Technical Research Institute of Sweden.

The use of Fixed Fire Fighting Systems (FFFS) in road tunnels is very different around the world, and so are the viewpoints. In countries like Japan and Australia, they have relatively long experience with FFFS compared to the rest of the world. The USA may have come further than Europe in the subject. However, more advances have to be made on both continents before FFFS in road tunnels are to be fully accepted and looked upon as a "natural" fire safety installation in tunnels. I also would like to state, without introducing any additional supporting facts, that the viewpoints also differ between different groups, or communities, of decision-makers, fire engineers, governments, entrepreneurs, financials and so on. This, combined with statements in the relevant literature, makes me argue that the viewpoints of the decision-makers are still generally negative in the world as a whole. However, this field is advancing very quickly and not much is left to pass the threshold to become fully acceptable. And yes, today there are tunnels being installed with FFFS.

I completely agree with you that there are benefits to using FFFS in road tunnels. In fact, I see many benefits and not only to limit structural damage. I think it can save lives. Whether or not the primary objective of the FFFS is to cool surfaces must be based on how the system is engineered and the fire protection objectives, namely, suppression or control. Specifically, the FFFS might be engineered to: 1. cool the hot gases, 2. attack the flames or 3. attack the base of the fire, or surfaces. Also, you say that suppression or control of the fire is not always possible and that FFFS in road tunnels are advertised as "preventing spread." I would describe preventing fire spread as control.

In the report, more experiments and examples of some catastrophic tunnel fires (CTF) are presented than in the article.

Finally, I want to say that reservations made in the past, though shown to be unfounded, are still sometimes used today. In the report, and in the article, I list some reservations against using FFFS in road tunnels and try to give as many objective comments and arguments to them as possible.

Respectfully,
Andreas Häggkvist

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VIEWPOINT > Role of ABET Accreditation in Professional Licensure & Fire Protection Education

By Erika Williams

Fire safety is vitally important to society, and so is the education that prepares fire protection professionals. ABET, the world leader in technical education accreditation, helps ensure a high-quality educational experience for fire protection engineering students through its accreditation process.

ABET is an organization of 30 professional and technical societies that share a common goal – ensuring students are prepared to enter their profession. The Society of Fire Protection Engineers (SFPE) works closely with ABET to develop criteria used to evaluate fire protection engineering programs. These criteria ensure graduates from ABET-accredited programs have the technical and professional skills to succeed as fire protection engineers.

As in all technical professions, fire protection engineers must stay current in the latest technologies and capabilities, and the same is true for accredited programs.

Attaining ABET accreditation is an 18-month "peer review" process that includes both self-evaluation by the institution as well as an on-site campus visit by an ABET team. SFPE, which joined ABET in 2009, selects program evaluators from among its membership. Then, ABET provides extensive training to prepare them to evaluate academic programs. Although the accreditation cycle is 18 months long, institutions continuously monitor and improve the quality of their programs through formal Continuous Quality Improvement (CQI) practices. Educators establish goals for student learning, assess the attainment of these goals against specific measurable objectives, and then use the results to improve the program's quality.

Professional licensure boards and certification bodies understand the importance of high-quality education as foundational to the successful professional. They look to ABET to help ensure that academic programs maintain that quality. In fact, many states require applicants for professional engineering licensure to be graduates of ABET-accredited programs.

What the Future Holds

As in all technical professions, fire protection engineers must stay current in the latest technologies and capabilities, and the same is true for accredited programs. ABET examines, and updates if necessary, program criteria on a regular basis to ensure its relevance. It is also why ABET criteria is flexible and non-prescriptive, enabling programs to be innovative and to keep pace with technological advancements.

One way programs ensure they're preparing students for the changing workplace is through the use of an industrial advisory group. This group consists of practicing professionals and provides specific feedback to the program's faculty and administrators. Their input is incorporated into the program, ensuring students are exposed to the knowledge and skill sets that industry needs.

ABET's International Reach

Geographical distances are quickly becoming less significant as trade becomes more prolific and cross-border job opportunities increase. This is why ABET is engaged around the world, accrediting more than 3,100 programs at nearly 650 institutions in 21 countries. ABET also partners with a number of national accrediting organizations responsible for assuring program quality in their home jurisdictions. The result is that students around the world have access to high-quality academic programs, and graduates enter the global workforce with an internationally recognized educational experience.

Just as technology constantly evolves, it is important for educational programs to continuously improve, innovate and support the professions for which they prepare students. Fire protection engineering programs use ABET accreditation as a means to do just that. The end result: students receive a high-quality education, graduates meet or exceed the professions' expectations, and employers are confident their new employees have the technical and professional skills necessary to succeed. Ultimately, the greater public benefits from a safer environment, in part designed by fire protection professionals.

Erika Williams is with ABET.

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Free Online Tool Aids Decisions on Residential Fire Sprinklers

The National Institute of Standards and Technology (NIST) has developed a free online tool to help sort through the costs and benefits of installing residential fire suppression sprinklers. The tool was designed for states, communities, new-home builders and prospective buyers alike.

The web-based "sprinkler use decisioning" tool enables users to assess the cost-effectiveness of fire sprinklers for their particular jurisdiction, development or dwelling. It provides the means for "apples to apples" comparisons of different installation scenarios. Users can input their own data to supply values for categories of costs and benefits in the model. They also can opt for a combination of user-defined data and national or local statistics.

By researching and supplying their own data on local sprinkler installation and maintenance costs, insurance premiums and credits, value of the house and contents, discount rate and other variables, users can get a realistic estimate of the cost-effectiveness, or "present value net benefits," of an investment in a sprinkler system.

Local government officials contemplating whether to add a sprinkler requirement to their building codes can run analyses for a variety of house sizes to explore the benefit-cost performance of sprinkler systems in a community with a diversity of residential styles and sizes.

For more information, go to *http://ws680.nist.gov/firesprinkler/default.aspx*

FM Global Awards US$400,000 in Fire Prevention Grants in 2010

FM Global awarded US$400,000 in fire prevention grants during 2010 to help nearly 200 organizations worldwide more effectively prevent fire in their communities.

Fire departments, brigades and other related agencies in the United States, Canada, India and the United Kingdom received grants. On average, each grant recipient received US$2,400 to bolster loss prevention initiatives such as community education, pre-fire planning and arson prevention.

During the last 35 years, FM Global has contributed millions of dollars in fire prevention grants to fire service organizations around the globe. Through its Fire Prevention Grant Program, FM Global awards grants that can have the most demonstrable impact on preventing fire, or mitigating the damage it can quickly cause.

"At FM Global, we're passionate about the notion that the majority of property damage is preventable, not inevitable," says Michael Spaziani, manager of the fire prevention grant program. "Far too often, inadequate budgets prevent those organizations working to prevent fire from being as proactive as they would like to be. With additional financial support, grant recipients are actively helping to improve property risk in the communities they serve."

For more information, go to *www.fmglobal.com/grants*

USFA Releases Large Loss Building Fires Report

The Federal Emergency Management Agency's (FEMA) United States Fire Administration (USFA) has issued a report examining the characteristics and causes of Large Loss Building Fires. The report is based on 2007 to 2009 data from the National Fire Incident Reporting System (NFIRS).

From 2007 to 2009, an estimated 900 large loss building fires were reported by U.S. fire departments annually. These fires caused an estimated 35 deaths, 100 injuries, and $2.8 billion dollars in property damage. In this report, large loss building fires are defined as fires that resulted in a total dollar loss of $1 million or more.

According to the report:

- Forty-eight percent of large loss fires occur in residential buildings.
- Exposures are the leading cause of large loss building fires at 22 percent, followed by electrical malfunctions (12 percent), other unintentional, careless actions (11 percent), and intentional (9 percent).
- A peak in large loss building fires is seen between the hours of 1 a.m. and 4 a.m.
- Attics are the primary origin of all large loss building fires, along with cooking areas or kitchens.

For more information, go to *www.usfa.fema.gov*

SFPE CORPORATE 100

The SFPE Corporate 100 Program was founded in 1976 to strengthen the relationship between industry and the fire protection engineering community. Membership in the program recognizes those who support the objectives of SFPE and have a genuine concern for the safety of life and property from fire.

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NEGOTIATING RISK ALLOCATION in Design Services Contracts

By James F. Lee, Jr., Esq., and Michael F. Germano, Esq.

Design services contracts, like all contracts, represent a mutual understanding of the parties' respective obligations and duties for the project at issue. Risk allocation understandings do not necessarily relate to the scope or the fee, but they are a catalyst for resolving issues and disputes that arise during or after a project. It is of paramount importance that these understandings weigh in favor of a fire protection engineering firm—at least to the greatest extent practicable.

Every fire protection engineering firm (the "firm") should seek to minimize risk in its agreements with prime consultants and owners. (For simplicity these parties are collectively referred to as the "owners.") The reasons for minimizing risk are obvious when the firm is the party undertaking the risk.

However, measures to minimize risk are equally as important in circumstances in which a firm is or would be covered by its professional liability policy. First, firms are often required to pay substantial deductibles when defending against an errors and omissions claim, which could adversely affect the profitability of the firm. Second, the absence of, or the minimization of claim payments and attorney fees result in lower annual premiums. Third, minimizing what a firm may perceive as "insurance risk" will also minimize exposure for claims in excess of the available insurance coverage limits.

This article reviews a number of issues to consider in contract formation and negotiation. It is imperative that a firm draft and use a set of STCs to begin the negotiation of each project. A well-crafted proposal could lead to substantial savings in terms of time and expense.

FAVORABLE PROPOSAL PROVISIONS FOR A DESIGN FIRM

A contract is not always a negotiated, written and signed agreement. In fact, a contract neither has to be signed nor written. Black's Law Dictionary[1] defines "contract" as "an agreement between two or more parties creating obligations that are enforceable or otherwise recognizable at law." A "contract" can be as simple as a handshake agreement or in certain circumstances a unilateral proposal sent by an engineer to an owner.

Most projects begin with a proposal sent from a firm to an owner. Upon the owner's receipt of the proposal,

the owner can do one of a number of things. First, the owner could do nothing (or it can expressly accept the proposal) and ask the firm to commence work. Second, the owner could negotiate the terms of the proposal. Third, the owner could send the firm a contract that incorporates the proposal for purposes of scope and fee only. Fourth, the owner could send to the firm its own contract and scope.

The first scenario is the best for a firm if the firm has taken steps to protect itself in its STCs. In this scenario, a proposal is first sent to an owner. Then the firm is directed to commence services. Throughout the project, the owner accepts the services and pays the firm in accordance with the proposal. There is a good chance that, in this situation, the owner has accepted the proposal as a binding agreement and is bound by its terms. (The likelihood of the owner being bound by the proposal and STCs is drastically improved if the proposal is signed.) This is the best opportunity for a firm to minimize its risk by the terms of its proposal and STCs, which should be attached to and incorporated by the proposal. Some ideal clauses for STCs are discussed in the following paragraphs.

Statute of Limitations

A contractual statute of limitations clause prescribes the date by which all disputes must be litigated. Some states, like Virginia, have a long limitations period (five years) for a written contract. Others, like Maryland, have what is called the "discovery rule," which specifies that the accrual period does not commence until an owner discovers a defect for which a firm may be liable. The limitations period could exceed a decade in states that have adopted the discovery rule. A carefully crafted statute of limitations clause can reduce statutory limitations periods and provide a firm with a defense against an owner's claim.

Limitation of Liability

Limitation of liability clauses specify the absolute maximum that an owner could recover from a firm. If the limitation is sufficiently low (or if the claim is sufficiently high), these clauses could be a deterrent to a lawsuit. If they are not a deterrent, they will minimize a firm's risk. The firm's preference should generally be to limit liability to the fee for the project. If a firm encounters resistance, the fall-back position should be to limit liability to the proceeds of a professional liability policy available at the time of settlement or judgment. It is unlikely that an owner will want to bankrupt a firm but reasonable that an owner should be able to avail itself of the firm's professional liability insurance coverage (after all, that's what it's for). Limiting liability to available proceeds guards against the rare instance where the firm has two significant claims against it in the same policy period. This clause has saved firms from bankruptcy.

Certificate of Merit

A Certificate of Merit clause requires a claimant, as a condition precedent to litigation, to obtain a signed and sworn statement of a professional specifying that in that professional's opinion, the firm has breached its duty to act in accordance with the applicable standard of care. This clause has the effect of weeding out frivolous lawsuits and preventing potential suits that the owner has not effectively evaluated from the standpoint of the appropriate standard of care.

Attorney Fees

STCs are an excellent place for a one-way attorney fees provision. Such a provision provides that if the firm is required to institute legal proceedings to collect fees owed, the firm shall be awarded all reasonable attorney fees associated with a collection effort.

Indemnification

Often a firm will rely on information provided to it from a governmental entity, a prime consultant, the owner or others. If a firm's reliance is reasonable, it should not be liable to the owner or to other parties for reliance on what may turn out to be inaccurate information. To combat this, a firm can draft a clause that compels an owner to indemnify and defend a firm from any claims or allegations of professional negligence or breach of contract arising out of the firm's reliance on third-party information.

Waiver of Consequential Damages

According to Black's Law Dictionary,[1] consequential damages are "damages that do not flow directly and immediately from an injurious act, but that result indirectly from the act." Examples of consequential damages include an owner's lost profits, lost rental income and additional interest on a construction loan. A waiver of these damages will limit an owner's recovery to the direct damages suffered as a result of the firm's negligence, which in many circumstances could amount to a substantial reduction in exposure to liability.

Third-Party Beneficiary

A firm should disclaim the existence of third party beneficiaries (where there are none). This clause is relevant when a firm contracts with a prime consultant or prime contractor. In such a scenario, a no-third-party-beneficiary clause will prevent an owner from suing the firm directly, which will significantly minimize the firm's risk of liability.

"MUST-HAVE" CLAUSES FOR A NEGOTIATED CONTRACT

Should the owner decide to negotiate the proposal, or counter with its own standard design services contract, a firm's ability to minimize risk is not lost. A counter-offer of this sort should be viewed as an owner's attempt to get more for less. A firm should not separate design scope and fee from contract terms. That is, as a firm incurs more risk, the design fee should increase. A firm's proposal is based on the firm's STCs. When the STCs are amended, so should the scope and fee.

For example, a firm proposes a scope and fee for a sprinkler system design and related construction phase services. The firm's terms and conditions limit liability to the amount of the fee. The owner then wants to strike the limitation of liability clause in its entirety. At that point, a firm can relay the fact that the fee is based in part on the limitation of liability. Unlimited liability creates greater risk and, as such, a higher fee. At that point, an owner may be likely to soften its stance on the limitation of liability or compromise by offering a policy limits limitation of liability. The importance of linking scope, fee and contract terms in a negotiation should not be underestimated. A number of examples of "must have" clauses are discussed in the following paragraphs.

Limitation of liability

A firm should insist on a limitation of liability. In most circumstances, it will be difficult for an owner to articulate a reason that it might want to seek uninsured assets of the firm. If the firm is large enough to handle a judgment or settlement in excess of its professional liability policy, an appropriate limitation of liability clause could state that the limitation of proceeds will be the available

proceeds of the firm's professional liability policy plus a dollar amount. In any event, a firm should always insist that its officers, directors, shareholders and employees will not have individual liability to the owner.

Indemnification for Negligence

Often an owner will insist on the inclusion of a provision in which the firm shall indemnify and defend the owner for claims and liabilities resulting from the work. A provision such as this may require a firm to pay for defense costs of an owner that may arise out of a third party claim against the owner that does not relate to the engineering services whatsoever. Such clauses are often written in a manner that requires the firm to "defend" the owner from "allegations" that "result from the work." Such clauses (1) do not require a determination that the third-party's claim has any merit and (2) do not require a determination as to whether or not the firm is at fault.

As a consequence, a firm should never agree to "defend" an owner. Additionally, a firm should demand that the indemnification clause be triggered only by the firm's actual negligence.

Lastly, indemnification clauses may void insurance coverage. When confronted with indemnification clauses, a firm should seek a coverage opinion from its professional liability insurance carrier or broker.

Standard of Care

A firm should always insist on a contract clause establishing a standard of care. The standard of care is the care ordinarily provided by an engineer practicing in the same or similar locality under the same or similar circumstances. Many firms market themselves as (and in fact are) "highly qualified." However, there is no reason for a firm to be bound to a standard that exceeds the standard of care. Under the law, firms that represent themselves in contracts as "highly qualified" will be held to a standard that will be difficult to defend. More importantly, such an agreement could cause the firm's professional liability insurance carrier to deny coverage because such a clause sets forth a standard of care that is above and beyond that of professional negligence, which is the standard for which firms are covered.

Firms should pay close attention to their marketing material and websites to ensure that they are not assuming any additional duties or obligations that could adversely affect the firm's risk. "Perfection is Our Promise" is the kind of motto that firms should avoid.

Construction Phase Services

For construction phase services, a firm should specify the number or rate of site visits. Visits "as may be required" or "as the project warrants" are subjective, open to interpretation, and have great potential to involve the firm in a dispute over whether they should have seen the contractor's defective work. The fee offered is based on a scope that considers a number of site visits. That number of visits should be provided with specificity; additional visits should constitute additional services.

Exclusions

Exclusions should always be part of a proposal. Exclusions demonstrate a clear understanding of what falls outside the scope of the project, but that could be inferred from the scope as the project progresses. A firm should disclaim any obligation to verify the documents presented to the firm by the owner; a firm should not be required to "re-engineer" such work.

A firm should make it clear that it is not a guarantor of construction means and methods or of the results of construction. The contractor should remain responsible for carrying out the work in accordance with the contract documents. Most importantly, a contract or proposal should contain a general exclusion, which states that all services not specifically described are excluded from the scope of the agreement.

By taking a series of small and inexpensive measures, firms can considerably minimize their exposure to liability. STCs should be reviewed and updated frequently to reflect developments in the law of the jurisdiction(s) in which firms are practicing.

James F. Lee, Jr. and Michael F. Germano are with Lee & McShane.

This article is an overview of contract terms and issues that confront design firms. This article is not and shall not constitute legal advice. For legal advice, please contact an attorney.

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1 Garner, B. (ed.), Black's Law Dictionary, West Law School, Eagan, MN: 2009.

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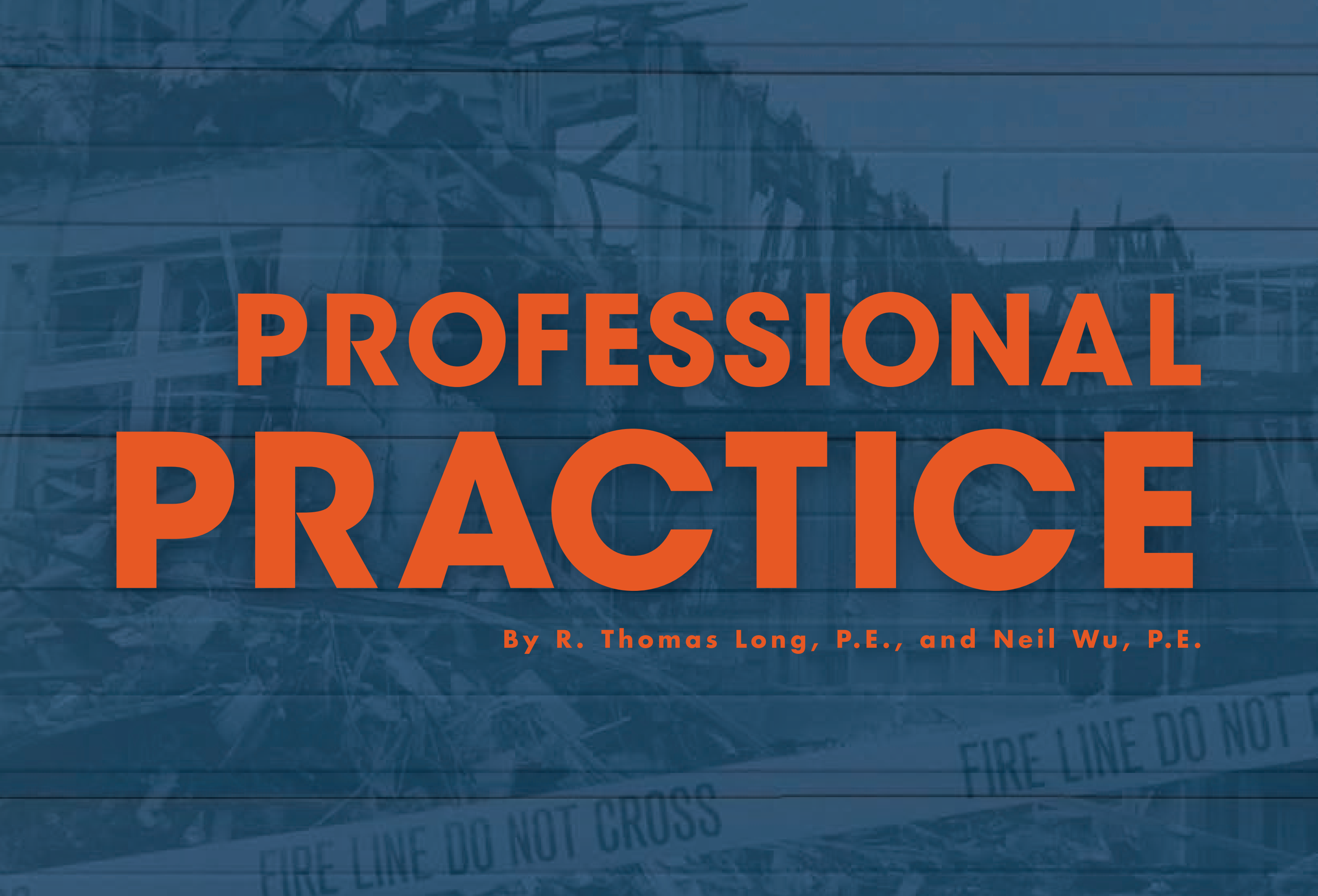


PROFESSIONAL PRACTICE

By R. Thomas Long, P.E., and Neil Wu, P.E.

Historically, fire protection engineers have been tasked with many different responsibilities in the design, review and commissioning of fire protection and life safety systems as part of the traditional construction process. These critical systems and building features are vital to the protection of occupants, emergency responders and the property itself in the event of a fire or other emergency. As such, states in the U.S. regulate the practice of engineering through professional engineering registration and licensure.

It is important for fire protection engineers to make the decision early in their career to place themselves on the course to becoming licensed as a professional engineer (P.E.). Professional licensing as a fire protection engineer brings many advantages. As an individual, the licensed fire protection engineer carries an important credential, bringing recognition from the engineering community. Licensure is one of the checks and balances available for providing safe and reliable designs for protecting life and property from the harmful effects of fire. While important for proactive building and construction tasks, the demand for licensure as a fire protection engineer can extend to post-incident matters.

Understanding the harmful effects of fire and the means to protect against them are central to the practice of fire protection engineering. Given this specialized background, more and more frequently fire protection engineers are tasked with investigating the cause of fires and explosions, as well as the failure of fire protection systems and their effect on life and property loss.[1,2,3]

Often, these failures or accidents lead to legal proceedings, and fire protection engineers, as with other engineering disciplines, are retained to provide specific scientific and engineering expertise in order for the legal proceedings to reach resolution. "Forensic engineering" services are becoming a common offering for organizations and companies with traditional fire protection engineering divisions. Forensic engineering is defined as, "the application of the art and science of engineering in matters which are in, or may possibly relate to, the jurisprudence system, inclusive of alternative dispute resolution."[4]

The topics covered in forensic engineering investigations can be quite broad, ranging from the performance of automatic fire sprinkler systems to the ignition and spread of fire on gaseous, liquid and solid fuels. Non-fire events, such as inadvertent fire sprinkler system operations, are also included in these investigations. For example, a fire protection engineer may be tasked with the investigation of whether or

not a fire alarm and detection system operated appropriately during a fire event. As part of the investigation, the fire protection engineer may also evaluate how the fire alarm and detection system's performance and/or other factors affected the outcome of the fire, including injuries, fatalities or property damage. This information is of value not only to legal proceedings, but to the fire protection community, as knowledge of past mistakes and successes can create awareness and possibly prevent repeat failures. The role of the fire protection engineer in these investigations, which often involve some form of legal proceedings, can include serving as an expert witness and explaining the facts collected and analyses performed to the judge and/or jury to assist with the resolution of the matter. This usually involves helping people who are not fire protection engineers to understand sometimes complicated, technical engineering issues.

Many states mandate that an individual providing (or offering to provide) engineering or consulting services to the public, which in some states includes investigations and expert witness testimony, must possess a professional engineering license. The path to licensure as a professional engineer varies by jurisdiction, but generally involves a combination of education, training, relevant work experience and successful completion of written examinations. Obtaining licensure by a particular jurisdiction means that an individual has satisfied a specific level of education, experience and training that signifies the individual is competent to provide engineering services to the public, as defined by that jurisdiction. Licensure can also supplement a fire protection engineer's credibility when called to perform an investigation. In turn, lack of licensure can jeopardize an engineer's ability to provide expert testimony in court.

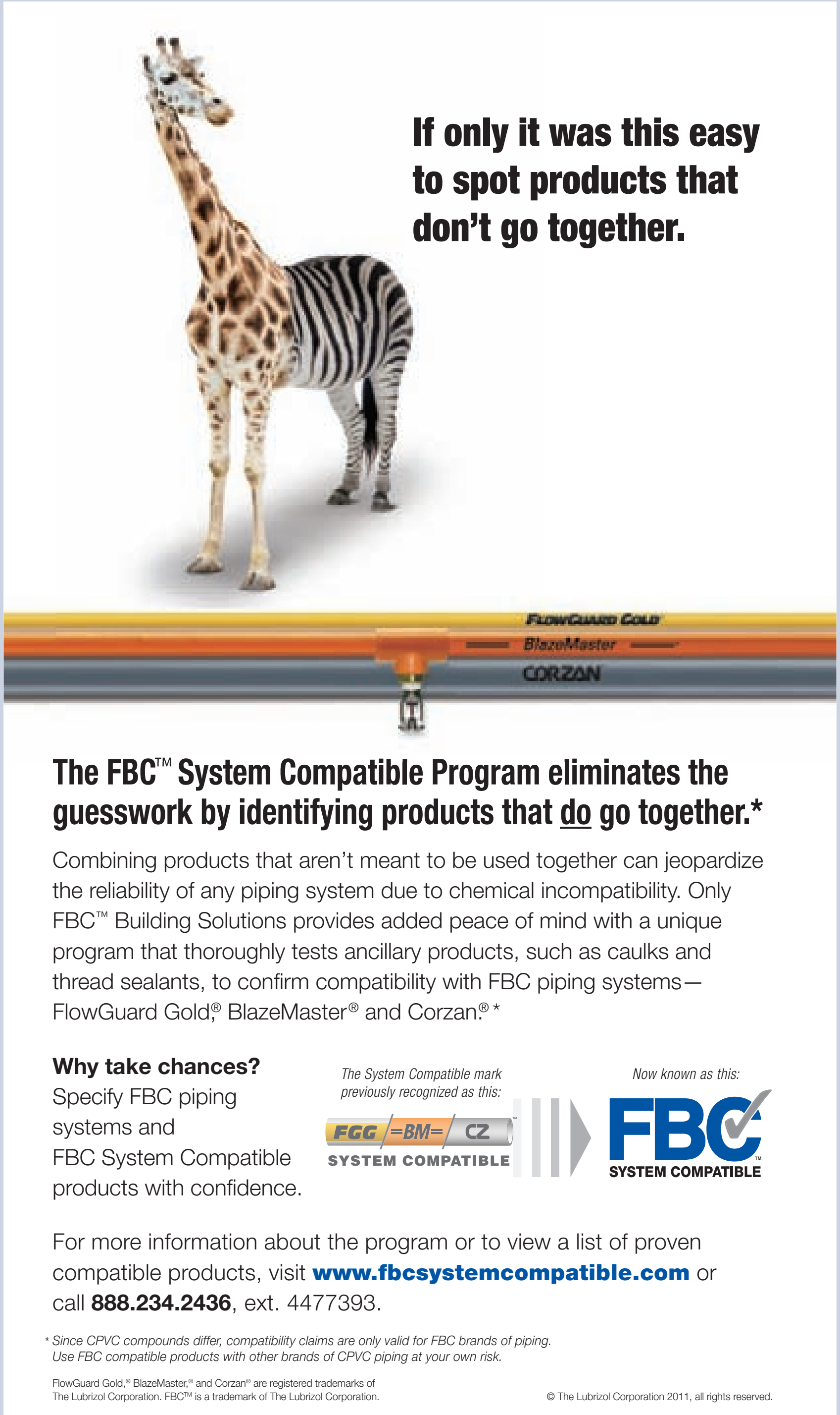
When called to testify as an expert in fire protection engineering-related matters, part of the legal vetting process may include assessing the fire protection engineer's credibility and ability to offer reliable expert testimony. In Federal Court, this process includes vetting through Federal Rules of Evidence. These rules mandate, among other things, that expert witnesses be qualified and that their opinions be reliable, as follows:

> **Rule 702. Testimony by Experts.**[5] If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

However, in some state courts, this assessment may include a review of the fire protection engineer's education, training, experience and licensure status.

STATE COURT RULINGS

Previously, some state courts have disallowed expert engineering testimony by unlicensed engineers. In 2006, the Alabama Supreme Court reversed a ruling of a lower court, which in effect upheld licensure



requirements for engineers who present expert testimony in court.

The case of Board of Water and Sewer Commissioners of the City of Mobile vs. James Hunter et al. involved a claim alleging negligent design, construction, operation and maintenance of the sanitary sewer system that served a residence. In support of their claims, the Hunters offered an individual to testify on the subject matter. The Water Board moved to strike this individual's testimony, as he was certified as an engineering intern by the state licensing board, but not as a professional engineer. At the time of this case, in Alabama, the term "testimony" was included in the definition of the "practice of engineering."[6] The following definitions were applicable at the time:

> Other states have definitions of the practice of engineering that include investigation and testimony; the laws specific to and defining "engineering" vary between states.

Engineer or Professional Engineer. A person who, by reason of his or her special knowledge of the mathematical and physical sciences and the principles and methods of engineering analysis and design, acquired by engineering education and engineering experience, is qualified to practice engineering as hereinafter defined and has been licensed by the board as a professional engineer.

Practice of Engineering. Any professional service or creative work, the adequate performance of which requires engineering education, training and experience in the application of special knowledge of the mathematical, physical and engineering sciences to such services or creative work as consultation, testimony, investigation, evaluation, planning, design and design coordination of engineering works and systems, planning the use of land and water, performing engineering surveys and studies, and the review of construction or other design products for the purpose of monitoring compliance with drawings and specifications; any of which embraces such services or work, either public or private, in connection with any utilities, structures, buildings, machines,

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> equipment, processes, work systems, projects, and industrial or consumer products; equipment of a control, communications, computer, mechanical, electrical, hydraulic, pneumatic or thermal nature, insofar as they involve safeguarding life, health or property; and including other professional services necessary to the planning, progress and completion of any engineering services.

The plaintiffs argued that the individual was trained as an engineer, certified as an engineer intern by the State Board, and had over 16 years of relevant experience in sewer-related matters. The plaintiffs also argued that the licensure law was unconstitutional, as the law was vague and what conduct was prohibited by the law was not easily discerned. The Mobile Circuit Court ruled in favor of the plaintiffs' argument and declared that the term "testimony" resulted in an unconstitutionally vague statute. The defendants appealed the decision to the Alabama Supreme Court, which ruled that the state licensure law was not unconstitutionally vague and that the definition established the minimum level of expertise required to qualify as an expert in engineering-related matters in the state of Alabama and was the same level required to obtain professional engineering licensure within the state.

As such, the Mobile Circuit Court decision was reversed and remanded. In this instance, significant experience without the proper professional engineering license was not sufficient to offer expert testimony as part of an engineering investigation. In 2007, the Alabama definition of "practice of engineering" was changed to include the following language:[7]

> Notwithstanding any other provision of this chapter, in qualifying a witness to offer expert testimony on the practice of engineering, the court shall consider as evidence of his or her expertise whether the proposed witness holds a valid Alabama license for the practice of engineering. Provided, however, such qualification by the court shall not be withheld from an otherwise qualified witness solely on the basis of the failure of the proposed witness to hold such valid Alabama license.
>
> The practice of engineering shall include the offering of expert opinion in any legal proceeding in Alabama regarding work legally required to be performed under an Alabama engineer's license number or seal, which opinion may be given by an engineer licensed in any jurisdiction.

Based on the current language (above), the offering of an expert opinion in Alabama does not require an Alabama PE license, provided the engineer is qualified to the satisfaction of the court. However, if the providing of an expert opinion includes


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prerequisite engineering actions, such as investigations or engineering analysis in a location in Alabama, an Alabama licensed engineer must be in responsible charge of that work.[8]

Other states have definitions of the practice of engineering that include investigation and testimony; the laws specific to and defining "engineering" vary between states. It is important for fire protection engineers performing investigations to be aware of these requirements, as well as the rules associated with performing work under the responsible charge of another licensed engineer.

LICENSING OVERVIEW

As with the definition of engineering, professional licensure for engineers is generally regulated by state-specific laws and rules. Currently, there is no uniform national standard for engineering licensure accepted within the United States and its territories, much less internationally. A professional engineering board entity is often created by each state and charged with regulating and enforcing the practice of engineering, including the licensure process within that state. The National Council of Examiners for Engineering and Surveying (NCEES), a national nonprofit organization, promulgates the NCEES Model Law[9] that reflects best practices as determined by the NCEES Member Boards. It is a model for state practice legislation and presents to the individual jurisdictions a sound and realistic guide that provides greater uniformity of qualifications for licensure, to raise these qualifications to a higher level of accomplishment, and to simplify the interstate licensure of engineers and surveyors.

To obtain licensure, an engineer must make application by completion of the state board-specific form, which often includes fields for personal information; education; detailed relevant work experience; the Fundamentals of Engineering (F.E.) exam and discipline-specific Principles and Practices (P.E.) exam scores; peer evaluations; criminal history; and licensure status in other states. All states currently charge an application fee for licensure as a professional engineer. After submittal, typically the state board will evaluate each application in accordance with their rules to determine if the applicant has satisfied the minimum requirements to be licensed as a professional engineer.

The NCEES develops, administers and scores the written examinations for engineers used for engineering licensure throughout the United States. Successful completion of the FE exam is typically the first step toward obtaining professional engineering licensure. The FE exam is an eight-hour written exam that covers a wide range of engineering topics. After completion of the FE exam and an appropriate number of years of work experience, an engineer may then qualify to take the Principles and Practices exam.

Licensure in one state does not imply or equate licensure in another. For this reason, an engineer may need to obtain professional engineering licenses in multiple states. The application process can be a tedious exercise, and the NCEES has established a program to facilitate transfer of records for reciprocity or comity of engineering licenses between states.

Professional engineering licenses require periodic renewals that range from annual to tri-annual. Renewal of an active professional engineering license often requires a fee. In some states, engineers must complete continuing education activities that serve as refreshers on discipline-specific engineering topics, as well as ethics, laws and rules for engineering.

R. Thomas Long and Neil Wu are with Exponent, Inc.

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DEMISE OF THE DACT

By Art Black

The American communications infrastructure is changing quickly. The requirements of NFPA 72[1] for fire alarm system communications between a protected premises fire alarm system and the supervising station have kept up with technology in some ways and have been left behind in other ways. This article explains today's options for fire alarm system communications.

THE PAST

Prior to 1993, fire alarm communications requirements were found in NFPA 71, Standard for Central Station Service. With the combination of all NFPA signaling standards into one document, these requirements were relocated to Chapter 4 of NFPA 72.[2] The organization of the *National Fire Alarm Code* has changed since then, but the requirements still can be found in the Supervising Stations Chapter (currently Chapter 26).

In the past, when a developer of a communications technology wanted to bring a product to market, the following procedure was required:

a. The new technology would be brought to the technical committee, where it was evaluated during the current code development cycle.
b. If the technical committee found the technology viable, the technology was added to the standard.
c. Once the NFPA standard was published, the manufacturer could get the product listed and take it to market.

In the 1980s, when technology moved at a more leisurely pace, this process worked well. Entering the 1990s and the 21st century, the technical committee realized that this time-honored process was too slow.

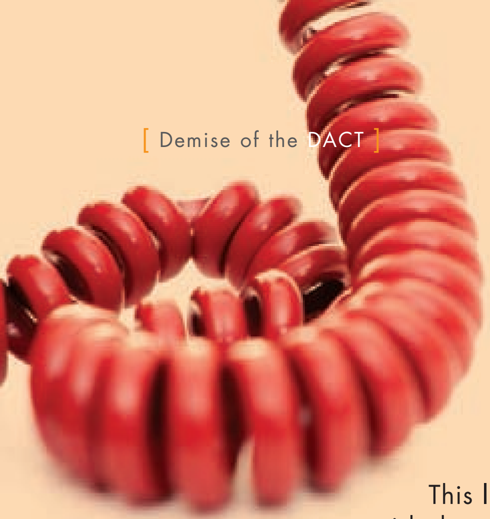
DEVELOPMENT OF "OTHER TECHNOLOGIES"

In 1999, a new section was added to the *National Fire Alarm Code* titled "Other Transmission Technologies".[3] This section was developed by the supervising stations' technical committee after much discussion and committee work and a decision by the committee not to add any more specific technologies. "Other Transmission Technologies" details a number of performance-based design features that any new transmission technology must meet to be listed. If a developer follows this section, then the product can be taken directly to the testing laboratory and get to the market in a timely manner.

THE WORLD OF TRANSMISSION TECHNOLOGIES PRIOR TO 2010

With the addition of "Other Transmission Technologies" in 1999, the lineup of possible technologies in the *National Fire Alarm Code* included the following:

a. Active multiplex
b. Digital alarm communications systems (DACS)
c. McCulloh systems
d. Two-way radio frequency multiplex systems
e. One-way private radio alarm systems
f. Directly connected non-coded systems
g. Private microwave radio systems
h. Other transmission technologies



This lineup provided specific technical requirements for each of the technologies listed, virtually unchanged since they were initially included in the standard.

NFPA 72-2010 HOUSECLEANING EFFORTS

In 2010, the Technical Committee reexamined each of the transmission technologies in the standard, using the "Other Transmission Technologies" section as a "litmus test" to determine whether the legacy methods could be eliminated. After this examination, the following legacy methods were eliminated from the 2010 edition of the standard:

Active Multiplex

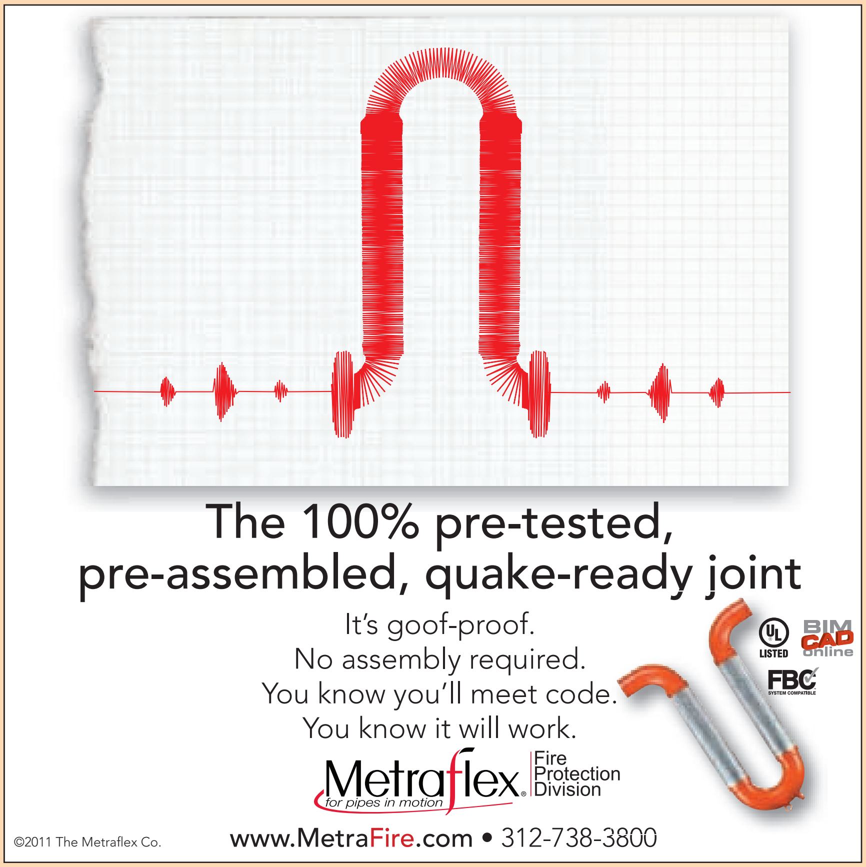
Active multiplex systems (also known as "derived local channel" systems) were developed by Wisconsin Bell in 1983 with the collaboration of several local fire alarm monitoring companies in Wisconsin. The system used a single telephone line, with a unit that split the bandwidth between voice and fire alarm data. Similar to today's DSL units, this was a leap forward for the era. With a single telephone line, one could have an "always on" connection to the fire alarm control panel and still use the telephone line for normal voice communications. Eventually, the specialized equipment required for this system became unavailable, and this method fell into disuse. Since all requirements of "Other Transmission Technologies" were met with this method, elimination of this method would not disallow any derived local channel systems still in use.

McCulloh

McCulloh systems are an even older technology, dating back to the late 19th century. These were wind-up wheels with cams that would transmit a signal (originally via telegraph) to a fire alarm dispatch center. After transmission, the McCulloh wheel would need to be manually rewound, which was the beginning of a requirement for a runner service for central station service. (Today's requirement for a runner to be dispatched when equipment needs to be reset by the prime contractor[1] continues this historical need.) Since direct copper connections were required, and the signals did not travel far, subsidiary stations were required, and as monitoring became regionalized, this form of transmission lost favor. Also, since McCulloh meets the minimum requirements of the "Other Transmission Technologies" section, McCulloh was eliminated in the 2010 edition of the *National Fire Alarm and Signaling Code*.

Directly Connected Non-Coded Systems

Directly connected non-coded systems were developed for use with remote station fire alarm systems. The remote station standard (NFPA 72C) was first issued in 1960, when the fire service began monitoring fire alarm systems directly at the fire station or emergency dispatch center. Directly connected non-coded systems used sub-voice grade copper telephone lines, and incorporated a polarity-reversal technique to signal the fire dispatch center. Unfortunately, this system only transmitted a fire alarm signal, not supervisory or trouble signals originating at the fire alarm control panel. Also, since it



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See us in Sweets on-line at http://products.construction.com Category 283100 was a "general" fire alarm signal, annunciator panels were required to be installed at each protected premises to indicate specific zone of initiation. Today, as local telephone companies are removing copper lines, and are not making the series 1000 sub-voice lines available, this technology is out-of-date and was removed from the 2010 edition of the code. In addition, any existing directly connected non-coded systems still meet the requirements of "Other Transmission Technologies."

Private Microwave Radio Systems

Private microwave radio systems were provided by a handful of manufacturers in the early 1980s. Since no private microwave radio systems survive, and the testing labs reported that no private microwave radio systems are currently listed, this technology was removed from the 2010 edition of the *National Fire Alarm and Signaling Code*.

NFPA 72-2010 ORGANIZATION

With the elimination of the four "legacy" methods, the organization of the transmission technologies section of NFPA 72 was changed to require compliance with "Other Transmission Technologies" (changed in 2010 to "General"), with exceptions for DACS and radio, which were found to be not in compliance with the performance requirements of "Other Transmission Technologies."

If DACS is selected as a transmission technology, the DACS section should be followed. If any listed radio technology is used, the radio sections (one-way and two-way) should be consulted for the requirements.

DACS

Digital alarm communications systems were first introduced to the technical committee in the mid-1980s, and were rejected by the committee twice because it had been determined that using "regular" telephone lines was not reliable enough. This was the first time that any proposed communications method was not controlled end-to-end by the technical committee. Instead, it was proposed to be under NFPA jurisdiction only to the point of demarcation at the protected premises, and once through the phone company, back under NFPA jurisdiction from the point of demarcation at the supervising station. This was relatively radical thinking, and it took a leap of faith in the telephone system for DACS to be approved, finally, on the third attempt. However, the technical committee members asked for, and received, some modifications, specifically regarding redundancy. DACS is the only communications method ever allowed for fire alarm that requires redundant lines throughout the process.

How DACS Work

A digital alarm communicator transmitter (DACT) is required to be connected to the public switched telephone network (PSTN) ahead of any customer-owned equipment. The connection needs to be on loop-start POTS telephone lines. (POTS is a telephone company acronym meaning "plain old telephone service"; i.e., standard telephone numbers.) DACTs are required to seize the telephone line and disconnect any other use of the line using a RJ-31X jack provided by the telephone company. DACTs cannot be connected to party lines or pay-phone lines. DACTs need to get a dial tone, dial the digital alarm communicator receiver (DACR) at the supervising station, get verification that the DACR is ready to receive, transmit the signal, and receive acknowledgement that the DACR has received and understood the signal.

Originally, the requirement for a DACS was that two telephone lines needed to be used. However, by 1996, the technical committee had changed that requirement so that only the primary means of communication needed to be a POTS loop-start telephone line. The secondary means of communication could be another phone line, a cellular phone, a one-way radio system, a derived local channel, a one-way private radio system, a private microwave radio system, or a two-way RF multiplex radio system.[4]

The traditional way of connecting a DACT to the fire alarm control panel uses two end-to-end copper POTS loop-start telephone lines, connected to the fire alarm system via an RJ-31X jack, as shown in Figure 1.

With telephone companies in the United States rapidly replacing copper telephone lines with fiber optic lines, the infrastructure that existed when DACS were originally approved has changed. Use

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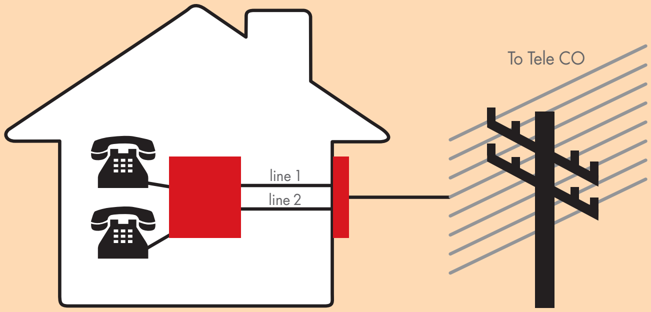

Figure 1. Traditional DACT Connection

Phone Company Fiberoptic Street Connection

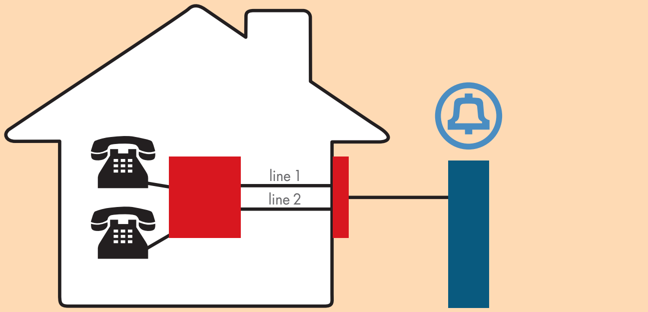

Figure 2. Fiberoptic Connection

Cable Company Broadband Coax Connection

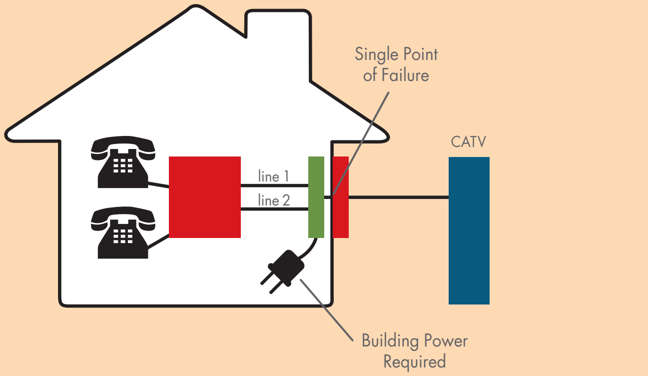

Figure 3. Cable Telephone Connection

of telephone company fiber optic lines should cause no technical problems with signal transmission, but there is one drawback — secondary power. Where standard copper telephone lines are powered by the telephone company central office (at least 96 hours of standby backed up by storage batteries, generators and sufficient diesel fuel supply), telephone fiber optic lines are powered by eight-hour standby batteries located in the field (on the poles or in the street pedestals), which is a problem because the telephone lines are only verified by the fire alarm control panel at 24-hour intervals.

Figure 2, compared with Figure 1, shows that except for the transmission method off premises, there is no significant difference between telephone company copper and telephone company fiber optic.

The third option today is to use cable company telephone service. When the cable industry first began providing voice telephone service, there was a technical problem with the CODEC used for voice compression by the cable industry.

Since then, the major cable providers have modified their software to emulate the telephone company, so from a technical transmission viewpoint, there is no significant difference. The issues involved with cable company telephone service are essentially those of standby power. Like the telephone company fiberoptic service, cable company standby power supplies are in the street pedestals, and are only sized for eight hours of service, so the line verification issues are the same. The added problem with cable company telephones, however, is that there is a cable box located at the protected premises that requires building power to operate. The loss of AC power at the protected premises may de-energize the cable box, leaving no telephone service. If there is a UPS connected to the box, the UPS is generally sized for less than eight hours of service, which exacerbates the line verification issue. In addition, there is a single point of failure between the cable box and the point of demarcation to the cable company, which, if compromised, takes out both telephone lines provided by the cable company.

Figure 3 shows the typical installation of a cable telephone connection to the fire alarm control panel. There are two issues not present with the traditional telephone company installations. First, there is a power requirement for the cable box. Additionally, there is a single point of failure between the cable box and the demarcation to the cable company.

Radio

There are currently several communication technologies listed to either the one-way or two-way radio legacy methods in NFPA 72.[1] The most promising of these radio methods uses one of two technologies, which have been shown to be reliable and, since they provide "heartbeats" on a regular basis, will indicate loss of channel immediately. The two technologies are mesh radio and GSM cellular radio.

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THE FUTURE OF FIRE ALARM COMMUNICATIONS

There were no changes in technology incorporated into the 2010 edition of NFPA 72. The changes in this edition were housekeeping in nature, removing obsolete technologies and reorganization of the remaining technologies.

On Dec. 21, 2009, AT&T petitioned the Federal Communications Commission to eliminate the landline telephone system. In their petition, AT&T stated that "with each passing day, more and more communications services migrate to broadband and IP-based services, leaving the public switched telephone network (PSTN) and plain old telephone service (POTS) as relics of a by-gone era." Obviously, this does not auger well for the future of landline-based telephone services, and when this happens, it will spell the official end of the digital alarm communicator as well.

In January 2011, the NFPA Technical Committee for Supervising Stations Fire Alarm Systems approved two proposals that, if they are accepted through the NFPA process, will also have an impact on the future of the DACT. First, there was a proposal to drop the requirement for a second telephone line, making the "alternate" communications method another technology. This will essentially kill the DACT, since all other communications methods in the standard are stand-alone methods. Second, another proposal will change the timer test for DACTs from 24 hours to six hours, to compensate for the change to an eight-hour standby power supply.

Art Black is with Carmel Fire Protection Associates.

References:

9 NFPA 72, *National Fire Alarm and Signaling Code*, National Fire Protection Association, Quincy, MA, 2010.

10 NFPA 72, *National Fire Alarm Code*, National Fire Protection Association, Quincy, MA, 1993.

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12 NFPA 72, *National Fire Alarm Code*, National Fire Protection Association, Quincy, MA, 1996.

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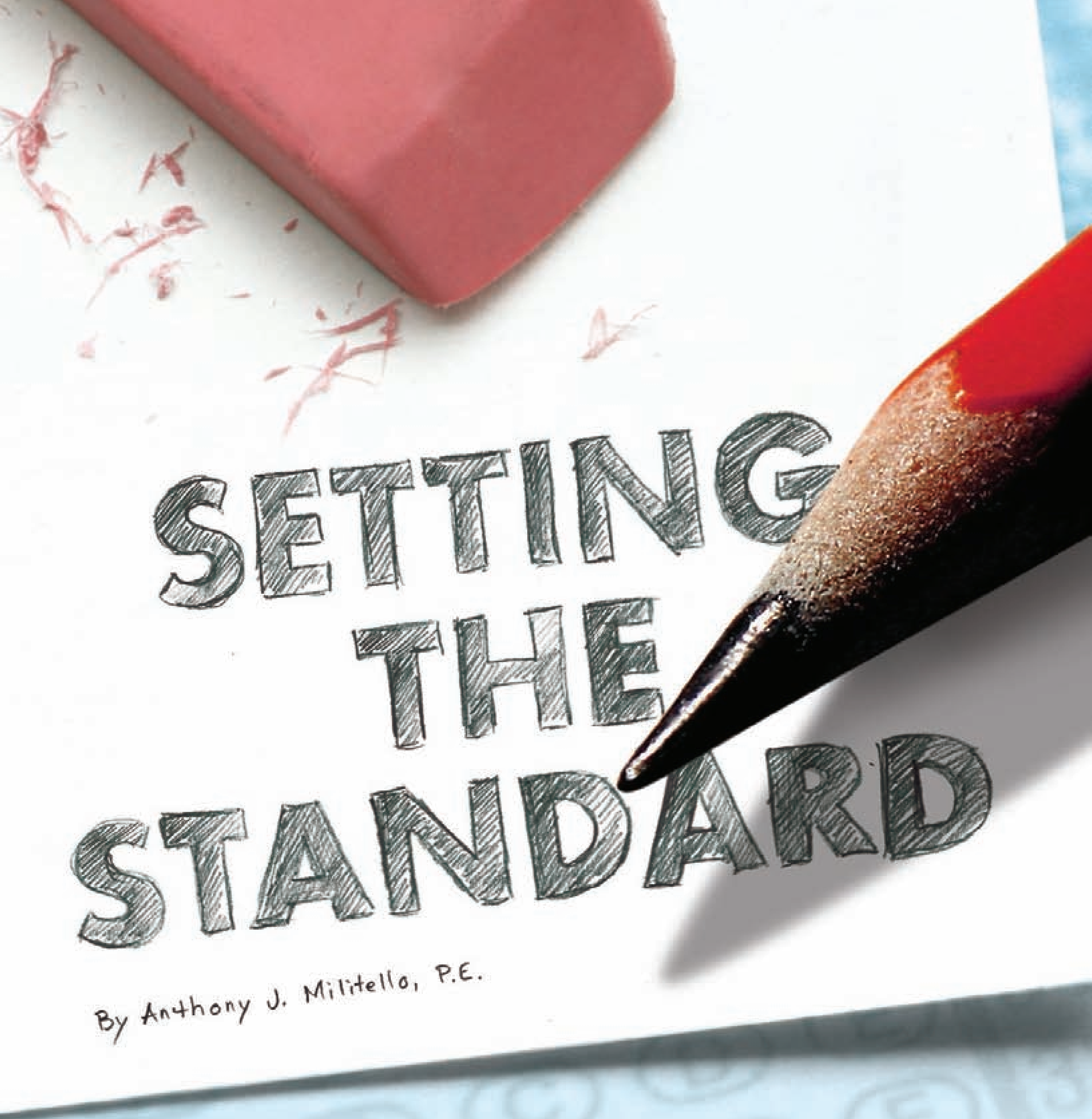

The principles and practice of the fire protection engineering exam serves as the method by which fire protection engineers become licensed professionals in the United States. Licensure as a professional engineer demonstrates that an engineer is competent to offer engineering services to the public, with the responsibility for the protection of public health, safety and welfare from fire and its effects. The magnitude of this responsibility is equal in intensity to the rigor associated with the identification of critical professional activities and knowledge/skills required for an individual to be considered competent to practice fire protection engineering, development of the exam specification, and the eventual assembly of each exam.

The National Council of Examiners for Engineering and Surveying (NCEES) is the organization that develops, administers and scores the examinations used for engineering and surveying licensure in the United States. It serves as the principal coordination and oversight body responsible for the professional activities and knowledge/skills identification process.

Between July and November 2010, the fire protection engineering exam specification underwent revision through a process called a Personal Activities and Knowledge/Skills (PAKS) Study. The PAKS study is intended to obtain information about the professional activities performed in a job and the knowledge and skills needed to adequately perform those professional activities. The output of the PAKS study is a test specification that serves as the framework for the examination that is used to evaluate an individual's minimal competency in a given professional field of practice. The PAKS process is required to be conducted every six to eight years, with the most recent study conducted in 2002 to produce a specification that was first used in the assembly of the October 2004 fire protection engineering exam.

DEVELOPMENT OF THE PAKS STUDY

The content of the PAKS study involves the technical support from a diverse team of professionally licensed subject matter experts (SMEs) serving on a task force

> Licensure as a professional engineer demonstrates that an engineer is competent to offer engineering services to the public.

and test specification committee, and survey participants. The diversity of the committees and survey respondents ensures that the exam specification accurately reflects the practice of fire protection engineering. The process commenced in July 2010 with 12 fire protection SMEs forming a task force to evaluate the professional activities and knowledge and skills important for an individual to demonstrate minimum competency in the field of fire protection engineering. The SMEs were diverse in gender, years of experience, field of practice, current professional responsibilities, type of employer and principal geographic area of practice.

The task force utilized the existing exam specification as the foundation for its analysis and evaluation of the professional activities and knowledge and skills. The task force identified 34 professional activities considered critically important for a fire protection engineer to be able to perform. The group also identified 99 knowledge areas and skills related to those professional activities considered critical to evaluate through the examination process. After these professional activities and knowledge areas and skills were identified, they were grouped into specific domains. Defining the content domain is a critical component in establishing the content validity of the credential, and the content domains serve as the basis for a survey that was developed and deployed to validate the beliefs of the task force.

SURVEY OF LICENSED PROFESSIONAL ENGINEERS

Prior to deploying the survey, 22 licensed fire protection engineers pilot tested the survey. The goal of the pilot test was clarity of wording, ease of use and comprehensiveness of content coverage. Upon receipt and adjudication of comments received from the pilot test participants, the survey was prepared and deployed.

This survey served to evaluate, through the response of a statistically significant number of licensed professional engineers, whether the professional activities and knowledge areas and skills identified by the task force represented those elements that practitioners felt were critical for determining the minimum competence of a licensed fire protection engineer. The survey was released in September 2010 and was open for five weeks. Only responses from licensed engineers were accepted. A total of 312 responses were utilized in the statistical analysis. The 312 response exceeded by 50 percent the minimum number of responses required for the data to be considered statistically significant.

More than 50% of the respondents passed the fire protection engineering exam to become licensed, spent more than 50% of their current time dedicated to hands-on practicing of fire protection engineering, and more than 50% of the respondents supervised or mentored other fire protection engineers. These statistics and the inclusion of this large number of diverse subject-matter experts enhance the confidence in the survey results.

An index of agreement (IOA) was developed to measure how well different subgroups of respondents agreed on which professional activities and knowledge areas and skills were important. The statistical analysis that evaluated the responses between subgroups concluded that a high IOA occurred between the following subgroups of respondents:

- years licensed as an engineer
- years in the fire protection field
- amount of time devoted to fire protection engineering
- job function
- area of primary practice
- region
- supervise/mentor engineers with less than five years of experience
- highest engineering educational attainment
- degree in fire protection
- gender
- race
- age

ANALYSIS OF SURVEY RESULTS

The test specification committee, composed of many of the same members of the task force, met in November 2010 to review the survey results and achieve a consensus on the professional activities and knowledge areas and skills considered important, and thus required to be included in the exam specification.

The first area of evaluation was for content coverage. The survey respondents were asked on a five-point scale, with 1 = very poorly and 5 = very well, whether the identified professional activity domains and the identified knowledge and skill domains adequately covered the required exam content. The means ranged from 3.66 to 4.07 for the professional activities and 3.74 to 4.08 for the knowledge areas and skills. This was considered sufficient to validate content of the survey.

The survey also requested respondents to rate the professional activities and knowledge areas and skills on a 5-point scale of importance with

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–noun, plural -cies

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[1] Definition by www.dictionary.com
[2] Definition by Wilkins, a ZURN company

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Domain	Specification Effective Beginning October 2004 Exam	Specification Effective Beginning October 2012 Exam
Fire Protection Analysis	20.0%	20.0%
Fire Protection Management	10.0%	5.0%
Fire Science & Human Behavior	15.0%	
Fire Protection Systems	35.0%	
Passive Building Systems	20.0%	
Fire Dynamics		12.5%
Active and Passive Systems		50.0%
Egress & Occupant Movement		12.5%

Table 1. PE Exam Specification

0 = no importance and 5 = very important. Critical importance was determined by evaluating the mean importance rating. In this study, the midpoint between moderately important (2) and important (3), or a value of 2.50, was selected as the cut-off line above which professional activities and knowledge areas and skills were considered critically important. Those below 2.40 were determined to contain insufficient priority and were excluded from inclusion in the exam specification. Those in the range of 2.40 and 2.50 were considered on the borderline and were evaluated individually to determine whether the default cut line was appropriate. The test specification committee's evaluation and adjudication of each mean importance rating was recorded as part of the specification development transcript.

The test specification committee concluded that those with borderline mean importance ratings, in fact, should be excluded from consideration in the test specification. The survey results and evaluation by the test specification committee decided that 27 of the 34 originally identified professional activities and 89 of the originally identified 99 knowledge areas and skills achieved high performance ratings and were required for the competent performance of a fire protection engineer. In addition to the quantitative responses, 125 narrative comments were received regarding the professional activities and 47comments were received regarding knowledge areas and skills. The test specification committee adjudicated all of these narrative comments prior to achieving consensus on the final exam specification content.

The survey requested respondents to identify the percentage of each domain they believed should serve as the basis of the test specification. Without viewing the survey results, the test specification committee independently suggested the percentage of each domain that should be identified on the test specification.

The average of the test specification committee responses matched the survey responses with very good agreement. The test specification committee used the percentages to determine the number of items to be asked on an 80-item exam.

The final activity of the PAKS study was to link each of the knowledge domains to at least three professional activities. This process serves to affirm that each professional activity that was identified as being a critical component of the professional certification process was being tested by a specific knowledge area.

FINALIZATION OF THE EXAM SPECIFICATION

The final exam specification was approved by the NCEES in February

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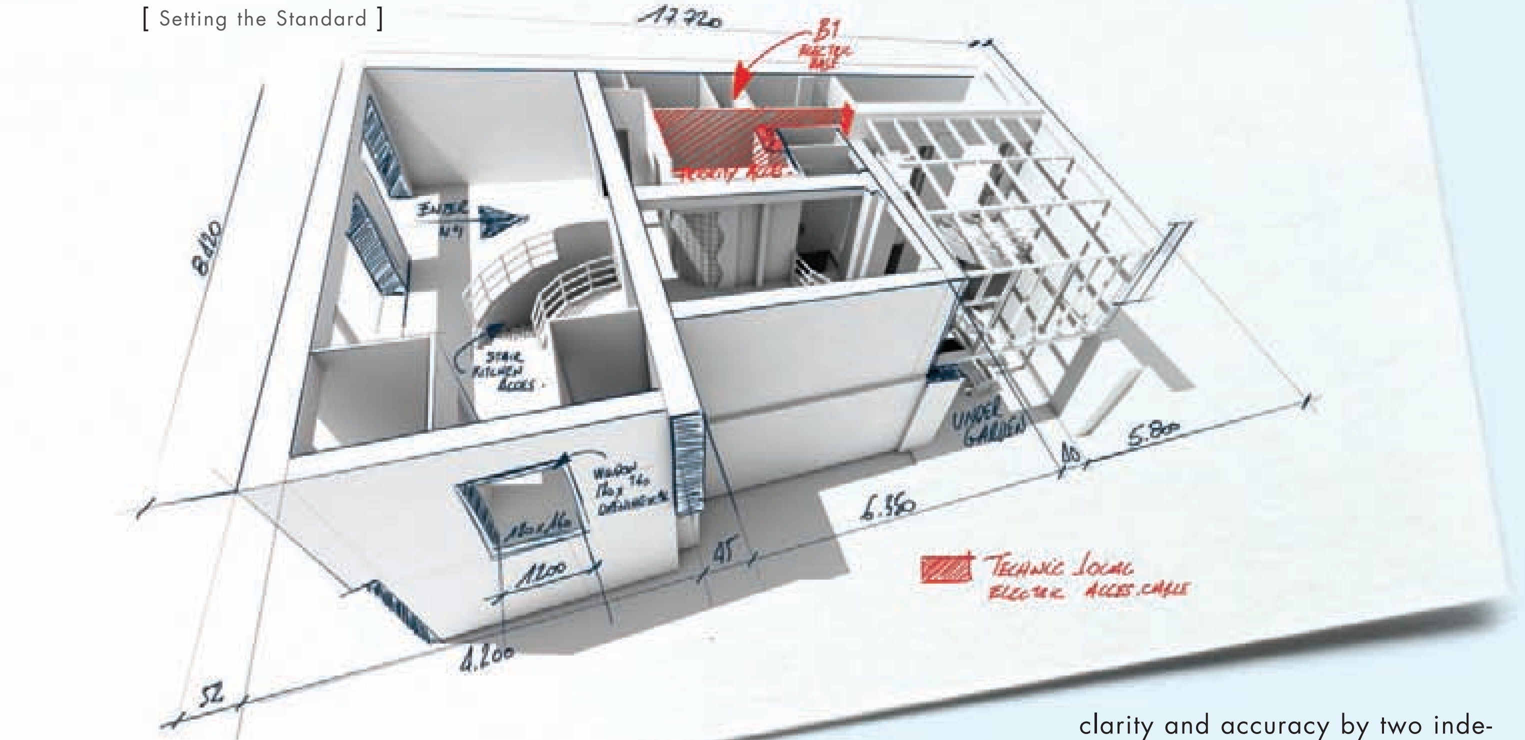

2011. The new fire protection engineering exam specification will be used for the first time in the assembly of the October 2012 exam. The current and newly approved exam specification can be found in Table 1 above (see page 40).

The complete specification for the next exam can be found at *http://www.ncees.org/Exams/PE_exam.php.*

The most significant changes in the new exam specification included the realignment of foam systems and water mist systems from water-based fire suppression systems to special hazard systems and the removal of an explicit reference to economic analysis. Foam protection systems, while water-based, were believed to be more appropriately associated with special hazard systems, and engineering economics was believed to be adequately covered on the Fundamentals of Engineering exam. While an exam item may still address economic analysis, it was determined not to explicitly identify this professional activity as one that required specific identification.

EXAM DEVELOPMENT

This new examination specification now serves as the foundation upon which future fire protection engineering exams will be assembled. The exam currently has 80 multiple response items. NCEES requires each area of professional practice to maintain a minimum of three exams worth of items, or 240 items, in an item bank. This item bank serves as the library from which items are withdrawn and used in the assembly of the annual exam. One reason for this minimum number of items is that items can only be used once every three years. This increases the reliability of the exam and reduces the possibility of compromise of exam items.

These items are created through item writing sessions held several times annually, and traditionally moderated by the Society of Fire Protection Engineer's staff. These sessions assemble registered fire engineers to develop exam items linked directly to a specification knowledge area or skill. After completion, each item goes through a quality control process by which it is validated for clarity and accuracy by two independent licensed professional engineers, and then finally approved for entry into the bank. Prior to being published in an exam, each item undergoes a final round of validation as each exam is pre-tested in the spring prior to the October exam. Pre-tests assemble a minimum of four licensed fire protection engineers to validate the clarity of each item and the accuracy of each response.

The fire protection engineering exam continues to perform statistically well, and the quality control process has provided the optimal result of not producing any item with more than one correct answer or where examinees must be given credit for any choice because of an issue with one or multiple item response choices. This performance underscores the quality of the item written by the professional fire protection engineering community, the quality control process, and the confidence that can be placed in those licensed fire protection engineers.

Anthony J. Militello is with the U.S. Navy.

Professor Nicholas Dembsey and student conducting flame spread research.

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PROFESSIONAL QUALIFICATIONS FOR DESIGNERS OF FIRE ALARM AND SIGNALING SYSTEMS

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The requirements for personnel qualifications in the 2010 edition of NFPA 72[1] and its predecessors have broadened over 30 years of code and standard evolution. "Qualified" is an intangible and subjective term and, therefore, cannot be defined in a way that applies to all situations. How, then, can a code or standard include qualification requirements that will help to assure that systems meet established performance goals – whether those goals are code minimums or specific, defined project performance requirements?

Merriam Webster[2] defines "qualified" as:

1 a : fitted (as by training or experience) for a given purpose; competent
b : having complied with the specific requirements or precedent conditions (as for an office or employment); eligible

The term "qualified personnel" has been used in NFPA 72 and its predecessors since before 1979 without any definition. (See sidebar "Recent History of Qualifications Requirements in NFPA 72".) In later editions of NFPA 72, examples of what it means to be qualified were added. However, it was not until the 2010 edition that the following definition for "qualified" was excerpted from NFPA 96 and included in NFPA 72:[3]

> Qualified. A competent and capable person or company that has met the requirements and training for a given field acceptable to the authority having jurisdiction.

Both the dictionary definition and the NFPA 72 definition require some way to determine if an individual or organization is "qualified" to perform certain tasks. They must have training or experience for a "given purpose." Or, they must comply with "specific requirements or precedent conditions." In the case of NFPA 72, they must meet the requirements and training for a "given field acceptable to the authority having jurisdiction."

NFPA 72 was reorganized in the 2010 edition and all personnel qualification requirements were co-located in Chapter 10, Fundamentals. The requirements for a system designer are as follows:[1]

10.4 Personnel Qualifications.
10.4.1 System Designer.
10.4.1.1 Fire alarm system and emergency communications system plans and specifications shall be developed in accordance with this Code by persons who are experienced in the proper design, application, installation and testing of the systems.
10.4.1.2 State or local licensure regulations shall be followed to determine qualified personnel. Depending on state or local licensure regulations, qualified personnel shall include, but not be limited to, one or more of the following:

1. Personnel who are registered, licensed, or certified by a state or local authority
2. Personnel who are certified by a nationally recognized certification organization acceptable to the authority having jurisdiction
3. Personnel who are factory trained and certified for fire alarm system design and emergency communications system design of the specific type and brand of system and who are acceptable to the authority having jurisdiction.

An important change in the 2010 edition, compared to prior versions, is the emphasis on state or local licensure regulations. This is consistent with a 2008 position statement issued by the Society of Fire Protection Engineers (SFPE), the National Society of Professional Engineers and the National Institute for Certification in Engineering Technologies (NICET).[4] That position statement sets forth the responsibilities for and the relationships between licensed engineers and engineering technicians for the design and layout of fire protection systems. Throughout the position statement, the word "qualified" is used to describe the participants of a project. The position statement points out that "engineers or engineering technicians overstep their respective roles if they participate in aspects of design for which they are not qualified by education and/or experience." It later notes that there are minimum education, training and experience established to help define qualifications for licensed Professional Engineers. NICET also has a program certifying fire protection engineering technicians that is based on minimum levels of experience combined with testing.

It is important for signaling system designers and technicians to work within established laws and regulations and stay within their area of expertise. The former is fairly black-and-white while the latter is sometimes more difficult to define. For example, when does the layout of a fire alarm system become the "practice of engineering"?

For fire alarm systems, an engineer should:

- select the system type and components
- identify the fire alarm panel location
- create system concept riser diagram(s)
- identify interface(s) required with fire safety functions, other fire alarm systems and other building systems
- determine average ambient sound level
- determine minimum illumination and placement of visual devices
- identify all initiating device and notification appliance locations.

Based on the engineer's design, the technician can:

- lay out the circuiting and placement of initiating devices, notification appliances and other system components
- prepare riser diagram(s)
- calculate notification appliance circuit voltage drops
- calculate battery size for secondary power
- select the specific equipment being furnished for installation.

> For most projects, particularly the larger and more complex ones, it is not likely that one person has all of the necessary qualifications to provide the best system design.

The results can be catastrophic where a person who is technically competent in the fire alarm system layout fails to engineer the system performance and fails to coordinate with other fire protection systems. (See the 2003 article "Engineering Failure or Failure to Engineer?" for additional discussion on this subject.[5])

Many people are familiar with engineers who have designed fire detection systems without careful consideration of how that system could be accessed for periodic inspection testing and maintenance. Many will say that a qualified fire alarm technician could have done a better job. Similarly, there are many examples of systems "designed" by fire alarm technicians that failed to adequately establish realistic fire protection goals and that failed to provide a system that would actually meet the owner's needs. Many will say that a qualified engineer could have done a better job. The authority having jurisdiction might find faults with the engineer or the technician. Those AHJs have seen those mistakes before and "know" they could do a better job. Then there are those AHJs that have forced installers to put in smoke detectors in every closet and crawl space of a building despite the lack of any code requirements and after being informed by an engineer and the installer that they provide little if any actual protection and will lead to numerous false alarms. The engineer and the installer "know better."

For most projects, particularly the larger and more complex ones, it is unlikely that one person has all of the necessary qualifications to provide the best system design. There are many phases in the life of a fire alarm or signaling system. There are also many different stakeholders, each of whom may be involved during different phases of the system life. Checks and balances between stakeholders is the best way to minimize and mitigate potential shortcomings.[6]

RECENT HISTORY OF "QUALIFICATIONS" REQUIREMENTS IN NFPA 72

Prior to the 1990 edition, the NFPA 72 series of documents only required that the testing and maintenance of systems "be under the supervision of qualified personnel." There were no requirements for system designers or other personnel involved in the life cycle of a fire alarm system. However, as systems were becoming more complex and more installations were being done for specific fire protection purposes other than simple code compliance, the industry recognized that many of the stakeholders had an impact on the quality, reliability and effectiveness of systems. So, starting with the 1990 edition, examples of personnel qualified to perform inspection, testing and maintenance of initiating devices were added to the appendix of NFPA 72E.[7] In 1993, as NFPA 72E was combined into NFPA 72, the list was moved into the body of the code.[8]

The 1996 edition was the first edition of the code that requires plans and specifications to be developed by "persons who are experienced in the proper design, application, installation, and testing of fire alarm systems."[9] In 1999, that paragraph was modified to require evidence of qualifications to be provided to the authority having jurisdiction upon request. In addition, examples were added to the annex of the code. Also in 1999, a requirement was added for installation personnel to be supervised by persons qualified and experienced in the installation, inspection and testing of fire alarm systems.[10] That requirement included a list of examples in the body of the code.

In 2002, there were no changes regarding "qualified personnel." However, a new section was added to permit authorities to require "verification of compliant installation" by a "qualified and impartial third-party organization."[11] That section describes a system of verification that is, in part, typically the responsibility of a system designer – verification that a system has been installed in accordance with approved documents and that it works as intended. This section permits an authority to require third-party verification in situations where the designer is also the person or entity that was responsible for the installation or the testing.

Examples of qualified system designers were relocated in 2007 from the annex to the body of the code. These requirements were later edited in 2010 and emphasis was placed on state and local licensure. Also in 2010, all "personnel qualifications" requirements were added to a common section (10.4) in the "Fundamentals" chapter. These include qualifications for system designers, system installers, inspection testing and maintenance personnel, and a new set of requirements for supervising station operators. Qualification requirements for persons who design, install or service public emergency alarm reporting systems remain in that system chapter (Chapter 27).

What will the 2013 edition of NFPA 72 add or change with respect to personnel qualifications? That is uncertain as the document is currently in the public comment phase. Possibilities include delineating differences between persons qualified and responsible for acceptance inspections versus periodic inspections; acceptance tests versus periodic tests; and general system maintenance versus system repair.

References:

1 NFPA 72, *National Fire Alarm and Signaling Code*, National Fire Protection Association, Quincy, MA, 2010.

2 *http://www.merriam-webster.com/* accessed 03/07/2011.

3 NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, National Fire Protection Association, Quincy, MA, 2008.

4 Society of Fire Protection Engineers (SFPE), National Society of Professional Engineers (NSPE), National Institute for Certification in Engineering Technologies (NICET) Position Statement, "The Engineer and the Engineering Technician, Designing Fire Protection Systems," July 28, 2008.

5 "Engineering Failure or Failure to Engineer?" *Fire Protection Engineering*, Winter 2003.

6 "Checks and Balances, the Consensus Process at Work," *Fire Protection Engineering*, Summer 2009.

7 NFPA 72E, *Automatic Fire Detectors*, National Fire Protection Association, Quincy, MA, 1990.

8 NFPA 72, *National Fire Alarm Code*, National Fire Protection Association, Quincy, MA, 1993.

9 NFPA 72, *National Fire Alarm Code*, National Fire Protection Association, Quincy, MA, 1996.

10 NFPA 72, *National Fire Alarm Code*, National Fire Protection Association, Quincy, MA, 1999.

11 NFPA 72, *National Fire Alarm Code*, National Fire Protection Association, Quincy, MA, 2002.


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SFPE Engineering Standard on Calculating Fire Exposures to Structures. The design of structural fire resistance requires three major steps: (1) determination of the thermal boundary conditions to a structure resulting from a fire; (2) determination of the heat transfer to the structure, or portion thereof; and (3) determination of the structural response of the structure. The *SFPE Engineering Standard on Calculating Fire Exposures to Structures* provides fire exposures for use in performance-based structural fire resistance design.

This standard addresses fully developed fire exposures, which include exposures arising from a fully developed fire within an enclosure and exposures from a localized fire involving a concentrated fuel load that is not affected by an enclosure.

Topics covered in this standard include determining whether a fire exposure should be considered as a local fire or an enclosure fire, prediction of fire exposures within an enclosure, prediction of heat fluxes from local fires, and documentation of the analysis. An extensive commentary provides background and guidance for the requirements in the standard.

The price is $58 for SFPE members or $161 for non-members (in the U.S.) and $63.70 for members or $201.15 for non-members outside the U.S. (Soft cover, approx. 70 pages)

PUBLICATIONS ORDER FORM

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Engineering Guide to Substantiating a Fire Model for a Given Application		
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UPCOMING EVENTS

August 15–16, 2011
Fire and Evacuation Modeling Technical Conference
Baltimore, MD, USA
Info: www.thunderheadeng.com/events/?event_id=4

September 13–14, 2011
METRO Seminar and observation of full-scale fire test
Brunskog, Sweden
Info: www.metroproject.se

September 19–21, 2011
Fire India 2011
New Delhi, India
Info: www.fire-india.com

September 26–28, 2011
2nd Annual Middle East FireSafe
Dubai, United Arab Emirates
Info: www.fleminggulf.com/cross-industry/middle-east/2nd-annual-middle-east-firesafe-2011

October 12–14, 2011
Fire Safety Asia Conference 2011
Singapore
Info: info@cems.com.sg

October 23–28, 2011
2011 Annual Meeting: Professional Development Conference and Exposition
Portland, OR, USA
Info: www.sfpe.org

March 14–16, 2012
5th International Symposium on Tunnel Safety and Security
New York, NY, USA
Info: www.istss.se

June 24–26, 2013
Interflam 2013
London, England
Info: www.intersciencecomms.co.uk

BRAINTEASER > Problem/Solution

Problem

Iodine-131 has a half-life of 8.0 days. If someone has one gram of Iodine-131, how long will it take before the mass decreases to 0.33 grams?

Solution to Last Issue's Brainteaser

At a child's birthday party, the father arranges three children in a line on three chairs, in such a way that child C can see both child A and child B, child B can see only child A, and child A can see none of the other children. The father shows them 5 hats, 2 of which are black and 3 of which are white. After this, he blindfolds the children, places one hat on each of their heads, and removes the blindfolds again. The father tells the children that if one of them is able to determine the color of his hat within five minutes, they will all receive extra ice cream. None of the children can see his own hat. After four minutes and 59 seconds, child A shouts out the (correct) color of his hat. What is the color of his hat, and how did he know?

Child C must see at least one white hat on the heads of A and B, because if he saw two black hats, he would know that he is wearing a white hat. Child B therefore knows that he and/or A is wearing a white hat. Since he cannot give an answer, he must see a white hat on A's head (if B would see A wearing a black hat, he would know that he himself wears a white one). From the fact that neither child C nor child B can give an answer, child A concludes that he is wearing a white hat!

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CASE STUDY

FIRE-LITE ALARMS

Fire-Lite Alarms Systems Protect Miles College

Protection 1 Brings Campus Buildings Up to Code, Going Hi-Tech with IP

The fire protection systems on the Miles College campus in Fairfield, Ala., have been updated by fire alarm and security integrator Protection 1 using Fire-Lite Alarms' MS-9600UDLS addressable fire alarm systems.

Utilizing an existing IP network for fire alarm reporting to Protection 1's central station, the school was able to boost the reliability and response time of fire alarm communications while eliminating the cost of two phones lines per system.

With an enrollment of more than 1,800 students, 800 of whom live on campus, Miles College recently began a new construction project, which triggered the need for its older campus buildings to meet newer fire code requirements. Cheryl Hill, sales manager with Protection 1, recommended Fire-Lite's MS-9600UDLS for the job.

Each MS-9600UDLS fire alarm control panel offers a capacity of 318 addressable devices on one Signaling Line Circuit. If more points are desired, an optional second loop can be added for a total of 636 addressable points.

Each building was fitted with stand-alone panels, along with the additional upgrades of 41 pull stations, 79 addressable smoke detectors, 22 addressable duct detectors, and 67 strobe lights. Monitoring is performed by Protection 1's 24-hour central station, which is backed up by four additional UL Listed, fully redundant monitoring centers.

Based on Protection 1's recommendation, the college decided to go with an IP (Internet Protocol) communicator, as opposed to traditional phone lines, for monitoring the four facilities' new systems.

"IP offers a safer way to make sure building occupants are well protected," said Hill. "This way the college doesn't have to worry about the fire system going off-line in the event that the phone lines go down."

The flexibility of the school's new systems can easily accommodate future expansions and upgrades needed for the growing campus.

Edward Jenkins, Miles College's physical plant director, is impressed with the fire alarms' immediate notification and Protection 1's same day service. "We are really pleased with our experience, not to mention the great service."

FIRE·LITE ALARMS by Honeywell

Fire-Lite Alarms
1 Firelite Place
Northford, CT 06472-1653
203.484.7161
www.firelite.com

GAMEWELL-FCI

Air Force Base Opts For Combo Fire Alarm/Mass Notification System

Several miles outside of Las Vegas, Nev., Nellis Air Force Base serves as the home and a major training site for the 64th and 65th Aggressor squadrons. The squadrons' facilities evolved from separate structures, to one building that shares a common wall. Separate fire alarm and mass notification systems (MNS) were installed on both "sides" of the building.

The MNS was restricted for emergency use only, offering little day-to-day benefit. After less than a year in service, the fire alarm system started degrading, initiating false alarms and often interrupting secure briefings.

Local integrator, Aberdeen Technologies, recommended the system be replaced with a Gamewell-FCI E3 Series® combination fire alarm and MNS, servicing both buildings. The new system routes emergency messages throughout both buildings, while providing each "side" its own control over routine messages.

Two remote annunciators and six Local Operating Consoles (LOCs) placed throughout the facility provide occupants and first responders immediate access to information and control of the entire fire alarm and MNS network.

Designed to MNS specifications mandated by the Department of Defense (DoD), each LOC from Gamewell-FCI is comprised of a Network Graphic Annunicator (NGA), microphone, and 16 programmable switches. The NGA supplies real-time status and event information from the entire network on a touch-screen, LED display. The microphone facilitates live-voice announcements while the LOC's 16 switches can be programmed to disseminate emergency notifications and control which building zones receive notifications.

Each squadron has a number of Sensitive Compartmented Information Facilities (SCIFs) where classified material is handled. To ensure electromagnetic isolation, SCIFs can only be connected to the "outside" world via fiber optic technology. The E3 Series fire alarm and MNS requires only two strands of fiber optic cable for alarm signaling and audio, which satisfied the facilities' security requirements and eliminated a mass of conduit and wire.

After seeing the system's communications capabilities, both squadrons utilize it on a daily basis for general paging. Furthermore, by storing communications data redundantly throughout its network, the E3 Series meets all DoD survivability requirements.

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CASE STUDY

HOOVER TREATED WOOD PRODUCTS, INC.

Material Usage and Fire Safety

In years past, wood played a significant role in structural fires throughout the United States. Buildings today, however, are designed to ensure structural and fire safety. Passive and active systems, building material selection, separation of buildings, and a better understanding of fire science has allowed wider use of wood in building construction.

One material enjoying wide use and broad acceptance is fire-retardant-treated wood (FRTW). FRTW is pressure impregnated, has a significantly reduced flame spread, and is tested in the ASTM E84 tunnel for a total of 30 minutes as opposed to other materials that are tested for only 10 minutes. Because FRTW is pressure impregnated, it is treated on all sides and inside, allowing its use in all types of construction and occupancies. Go to *http://www.frtw.com/pyro-guard_technotes*.php and click on "Code References." The Technical note shows the applications permitted in the most commonly used building and fire codes.

Most structural lumber species can be treated. There is no oriented strand board (OSB) panel recognized as fire-retardant-treated wood. Only plywood is recognized as FRTW.

Fire-retardant paint is not recognized where FRTW is allowed. In fact, the ICC-ES, in its Acceptance Criteria AC363, specifically states surface-applied coatings are not recognized as FRTW.

Surface-applied paint can allow sufficient heat buildup under the coating, which results in the ignition of the underlying untreated wood. Laminated panels have the same shortcoming as painted panels (i.e., a base of untreated wood). Testing has shown the side of the panel with no laminate has a flame spread of 140; far in excess of the 25 or less required by the codes.

The codes require labeling of FRTW materials for identification and code compliance. Look for the UL mark and 30 minute test.

The proper use of code-complying materials plays a critical role. FRTW is one component in today's buildings helping to achieve building safety goals.

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A Focus on the Next Generation of Open-area Smoke Detection Technology

Infrastructure with large-open spaces presents unique challenges for fire detection systems. Buildings such as stadiums, large atria, airports and rail stations, hotels, convention centers and warehouses demand a fire detection solution that is sensitive to diluted smoke, is non-intrusive on the space and operates reliably without frequency of nuisance alarms. Optical beam smoke detection systems have commonly been applied in these applications due to their cost effectiveness and simplicity. However, the perceived issues with traditional beam detectors have primarily been their difficulty to align and proneness to nuisance alarms.

The industry strives to improve methods to reliably and economically identify false stimuli such as dust, steam, obstructions and misalignment while ensuring a safe response to real threats. Technology innovations known as Open-area Smoke Imaging Detection (OSID) have emerged which improve on the fundamental basis of optical beam detection.

This webinar will discuss technological advancements of smoke detection for large open areas.

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Presenters:
Wes Marcks - *Regional Sales Manager*
Sue Sadler - *Vice President Sales*

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www.bete.com

—BETE Fog Nozzle, Inc.

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T-Links Self-Regulating Heating Cable provides a specified amount of heat anywhere along its length in direct response to local temperature or thermodynamic variations to maintain process heating and prevent freezing. Featuring pre-terminated water-tight connectors and modular cable lengths, the cable eliminates custom cutting, scrap, splicing and in-field connector fabrication. Available in standard lengths ranging from 5 ft. to 200 ft. (custom optional), the cable can maintain temperatures up to 150 F. Users can replace sections in minutes without tools.

www.rscc-heattrace.com

—Heat Trace Products, LLC

Aspirating Smoke Detector

The new FAAST™ Fire Alarm Aspiration Sensing Technology model 8100 detector eliminates the need for technicians to create a separate parallel data network to identify the location of an initiating device. FAAST's TCP/IP connectivity is achieved through its onboard Ethernet port. Beyond e-mail notifications, this interface enables facility managers to monitor the detector from any Internet browser, smart phone or mobile device with VPN capability from anywhere in the world where Internet access is possible.

www.systemsensor.com

—System Sensor

Horizontal Sidewall Sprinkler

The VK484 residential horizontal sidewall sprinkler offers low water flow and pressure characteristics for both flat and sloped ceilings. It is cULus listed for up to 16 x 20 ft. coverage areas and can be installed with the deflector up to 12 in. below the ceiling. In sloped ceiling applications, the VK484 is listed for ceilings with up to a 1/3 in. (18-deg.) pitch, with the sprinkler installed to discharge across the slope. For 16 x 20-ft. rooms, it provides a listed flow rate of 22 gpm for flat ceilings.

www.vikingcorp.com

—Viking Corp.

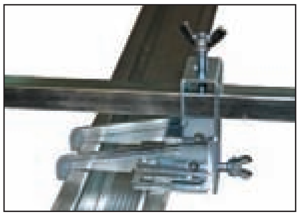
Fire Panels

Potter Electric Signal Co. has released a new line of Addressable Fire Alarm Systems (the PFC series with up to 30, 75 or 127 addressable points expandable up to 508) with a full complement of modules, detectors, notification devices and voice evacuation systems. This new suite of systems features advanced technology such as system-wide synchronization, Ethernet connection and e-mail communication capability.

www.pottersignal.com

—Potter Electric Signal Co., LLC

Sprinkler Fittings



Victaulic has expanded the AquaFlex® sprinkler fitting line to include solutions for hat furring channel systems installed above a dry wall ceiling. It includes the patented, installation-ready 1-Bee2 open-gate bracket design, which allows for fast sprinkler installation with no tools required. Sprinkler installation options include pendent, recessed pendent and concealed. Currently, this product is only available in North America.

www.victaulic.com

—Victaulic

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PRODUCTS / LITERATURE >>>

Internet-Ready Fire Alarm System

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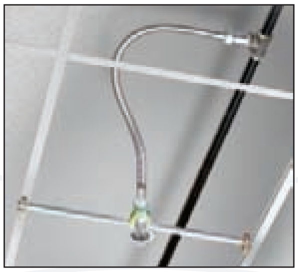
www.simplexgrinnell.com

—SimplexGrinnell

Sprinkler Head Installation



The FireDrop corrugated flexible armover has a centering bracket and fully adjustable T-bar and brackets to make positioning quick and easy. FireDrop was designed in accordance with NFPA 13, 13D and 13R, and tested and approved by UL under UL 2443. The bracket accommodates both 1/2-in. and 3/4-in. reducers, and enables the installer to adjust for pendant and semi-recessed sprinkler heads. Suitable for use in wet and dry systems.

www.fireloop.com

—Metraflex Co.

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www.siemens.com

—Siemens Industry, Inc.

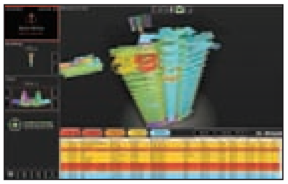
Range Hood Fire Suppression

The Designer Series Range Hood offers fully integrated, wet chemical fire suppression technology in a value-priced, fast-response package. This model is suited for apartments, student and public housing, and any home or business in need of over-range fire suppression. Available in both ducted and recirculating calibrations, it can be finished in a variety of colors. Upon system actuation, the Designer will shut down power to the range (gas or electric) and communicate with a central alarm system.

www.denlarhoods.com

—Denlar Fire Protection

Annunciation, Monitoring and Control Software Application



The Mircom Group of Companies, a global provider of advanced fire life safety systems and communication products, has introduced the Open Graphic Navigator (OpenGN) software application. OpenGN is a PC-based annunciation, monitoring and control software application for the Fire, Life Safety, Communications and Security marketplaces. "OpenGN provides an aesthetically pleasing, customizable graphical interface with an intuitive navigation system," says Jason Falbo, vice president engineering, Mircom Group. "Though designed with fire alarm in mind, the open nature makes it a great fit for many other markets such as security, building management, and asset management and protection."

www.mircom.com/opengn

—Mircom

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www.harringtonsignal.com

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FIRE PROTECTION Engineering

Fire Protection Engineering (ISSN 1524-900X) is published quarterly by the Society of Fire Protection Engineers (SFPE). The mission of *Fire Protection Engineering* is to advance the practice of fire protection engineering and to raise its visibility by providing information to fire protection engineers and allied professionals. The opinions and positions stated are the authors' and do not necessarily reflect those of SFPE.

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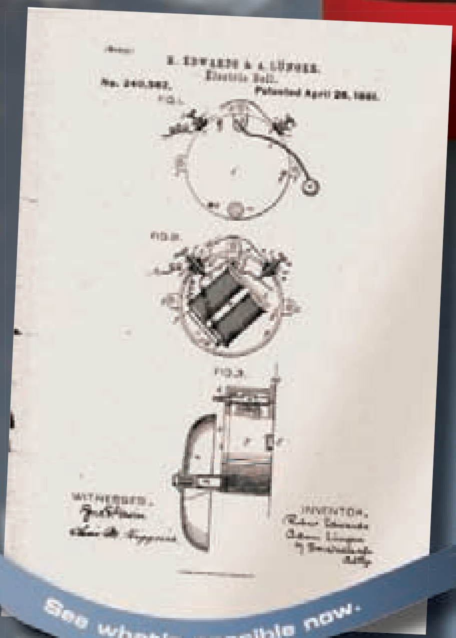

In 1881 when Robert Edwards invented the electric alarm bell, he began a tradition of innovation that would chart the course of fire protection for the next 130 years. Today the company that bears his name draws on this rich legacy of inventiveness, and benefits from new alliances established with one underlying goal: uncompromised excellence.

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