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Professional Development

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QUARTERLY
JOURNAL OF FORENSIC ENGINEERING
FIRE CAUSE INVESTIGATION

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30 Years and Counting...



Frank Johnson, P.E.
President / CEO

System Engineering And Laboratories (SEAL) had its beginning in March 1981. I began my initial consulting business following my employment in oil field drilling and safety. My roots in laboratory operations began with assignments in the Air Force Weapons Laboratory and my work on the Airborne High Energy Laser Research Program during the 1970s.

I founded and developed the business on original in-house capabilities with an emphasis on service to clients. SEAL, unlike most others, is not a spin-off or copycat business. We have maintained our originality and third party independence for the past thirty years. SEAL is a privately held independent testing laboratory.

Our engineering and scientific capabilities include mechanical, electrical, structural, safety, and industrial engineering. SEAL's technical services include fire and explosion investigation, vehicle accident reconstruction, oil field accident investigations, product testing, Finite Element Analysis (FEA), material failure analysis, and many other areas of expertise.

I am proud of our past thirty years of service. By far, our most important asset is our engineering team and support staff. Please visit our website at www.sealcorp.com.



How Safe is Your Residential Pool or Spa?

CPSC recommends that residential pool and spa owners adopt water safety steps to prevent children from accessing the water when there is no adult supervision, and they are appropriately protected when an adult is available to supervise.

By asking and answering these critical questions, you can gauge the effectiveness of your water safety measures, and determine what steps need to be taken to protect children from drowning and submersion injuries:

- Is there a fence around the perimeter of your pool or spa?
- Are there self-closing and self-latching gates?
- Are there door, gate or pool alarms in use?
- Does your pool have anti-entrapment drain covers that are compliant with the P&SS Act?
- Are all pool and spa covers in working order?
- Has the public pool or spa you use been inspected to ensure it is compliant with federal, state and local laws?
- Has someone in the family received training in CPR, first aid and emergency response?
- Has everyone learned to swim?

Keeping a POOL Safe...



Gary L. Jackson, P.E., CSP
Senior Consulting Engineer

I have recently had the opportunity to work on a couple swimming pool and whirlpool projects and found that this area of expertise and subject matter is not well populated with Consulting Engineers.

Swimming pool structural and soil issues are not common homeowner claims, but have been the subject of many insurance claims we have investigated over the years, especially with regard to vinyl lined in-ground pools. Leaks and plumbing issues, along with equipment issues, are frequently the scope of our engineering investigations.

It was just 10 years ago, as my wife and I were discussing whether to include an in ground swimming pool during a renovation project at our house, that I was anticipating my very own future grief and regret of the work that I would put in to just to maintain the pool, I had heard stories from other pool owners warning me not to do it. Despite my fears of the future maintenance, I found the project to be very interesting as I watched the construction from the very start.

The project was just outside our back door, so we were always watching the progress. Digging the hole, placing the steel, spraying the gunite, and applying the plaster, along with the tile and cool decking was interspersed with laying the PVC water lines, and connecting them to the pool equipment. It was like having a reality show in my own back yard!

As a result of this experience, over the last 10 years, I have become more familiar with the chemistry and equipment, as I've maintained the pool and repaired and replaced several parts of the mechanical equipment, such as the pool pump motor and electronic ignition for the spa heater. Each of the elements involved with the construction of our swimming pool and spa; such as, structural and soil issues, plumbing and leak issues, and pool chemistry are all areas in which I now have expertise and experience. My familiarity with terminology and construction processes has been of significant value to me when working with projects involving problems on a swimming pool or whirlpool.

One of many things I have learned is The Virginia Graeme Baker Act, which is a law for public pools. It went into effect a couple of years ago, and deals with avoiding entrapment in swimming pool drains. This Act was named after the 7 year old girl that died in a tragic drowning incident because of a pool drain. The CPSC has been trying to raise public awareness about this issue as well as overall swimming pool safety. They have recently published numerous recalls for consumer (private) drain covers which create the same danger. For more information on these safety issues go to <http://www.poolsafely.gov/>.

If you are in need of expert or consultant advice in any of these safety or technical issues I have mentioned, you can contact me through our website or by calling our offices here at SEAL.



Electricity as a “cause” of fire.



Kelley M. Stalder, P.E.
Electrical Engineer

Every day we use electricity, in our homes, offices, even in our cars or on our commute to work, seldom giving thought to the technology behind it. History reveals our fascination and intrigue over its discovery. As we have studied it and found ways to harness this technology, over time we have become, as a society, comfortable with its daily use.

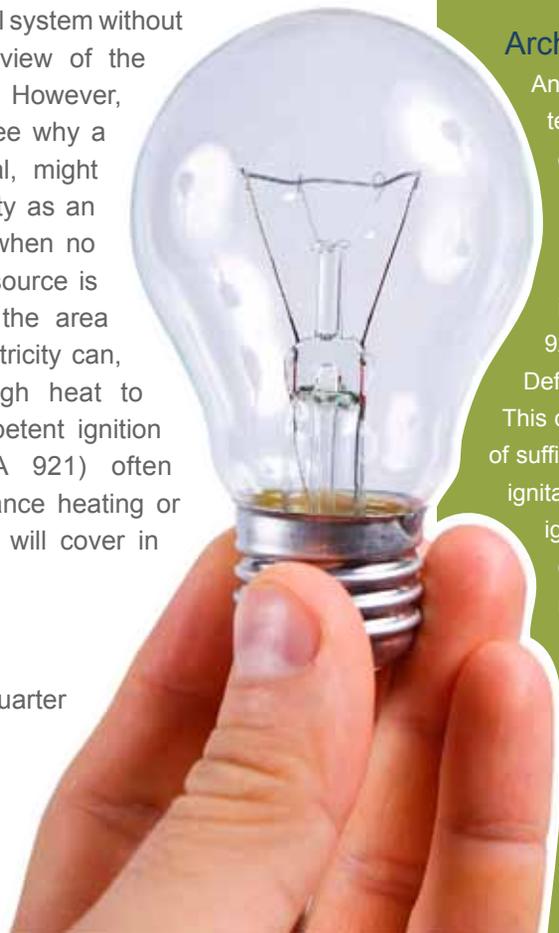
In fact the technology behind electricity, its delivery and use, has become so dependable that we are insistent of its availability when we “flip a switch.” If the power fails, we become upset. Not knowing the technology behind the source, we sometimes take risks or ignore problems, many at our own peril. This very dependability has fostered an environment in which we do not have to understand the technology behind electricity to use it, even though it is a huge part of our everyday lives.

Often, when a specific cause for a residential or commercial fire cannot be identified it is tempting for a nonprofessional (lay person) to suspect and name electricity as the cause. I have seen reports where the ignition source was identified as electrical when in fact no electricity was being supplied to the structure! Take the case where all indications were that the fire started in an outlet behind a refrigerator in a residence. The fire spread was arrested early in the incident so the damage was easy to follow back to the area behind the refrigerator. The components that were not plastic were all that was left of the receptacle and the faceplate and box were missing. It would seem a pretty clear case but

for one fact: the electricity had been shut off to the residence two days before the fire.

Most professional investigators and engineers resist the temptation to place blame on the electrical system without a thorough review of the whole system. However, it is easy to see why a nonprofessional, might abuse electricity as an easy “culprit” when no other ignition source is identifiable in the area of origin. Electricity can, produce enough heat to act as a competent ignition source (NFPA 921) often through resistance heating or arcing which I will cover in our next issue.

Part 2 - Next Quarter



How Does Electricity Start Fires?

Electricity produces sufficient heat to act as a competent ignition source (NFPA 921) in one of several ways. Two such methods are resistance heating and arcing.

Resistance Heating

Resistance heating (which is also called Ohmic heating or Joule heat-ing) is a fairly simple process of applying voltage (AC or DC) to a conductor (wire or other suitable conductive material) to produce heat. The relationship between the voltage applied and the resistance of the material translates directly to the heating produced.

Arching

An arc is “A high-temperature luminous electric discharge across a gap or through a medium such as charred insulation” (NFPA 921, Chapter 3 Definitions, 3.3.7). This discharge must be of sufficient energy to raise ignitable material to its ignition point. In the case of an arc, the relationship between the voltage, current, the medium (such as air), and the duration of the arc determines whether it is sufficient to produce ignition.



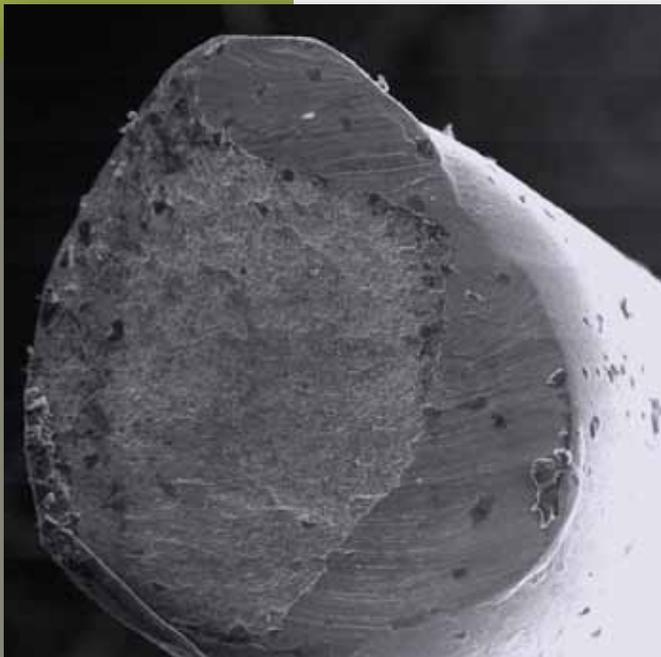
On The Fire Scene.

Accident or Arson? *Know the Red Flags!*

it may be helpful for insurance adjusters, and others who are not professional fire investigators, to have basic knowledge in detecting items or situations at a fire scene that may be an indication of an intentionally set fire. First, when arriving at the loss location, be aware of the area or property around the structure. Look for signs of vandalism - other than fire. Remember to pay close attention to the following:

-  **BUSINESS PROPERTY:** Prior removal of tools, computers, machinery, etc.
-  **MULTIPLE ORIGINS:** Fire started in two or more separate locations.
-  **ODORS:** Gasoline, lighter fluid, diesel.
-  **PAST HISTORY:** Previous fires, prior settlements received.

-  **WITNESS STATEMENTS:** Inconsistencies between occupants or witnesses.
-  **CONTAINERS:** Gasoline cans in the yard.
-  **FORCED ENTRY:** Fire department or burglar.
-  **PERSONAL PROPERTY:** Prior removal of televisions, stereos, guns, clothing, etc.



CAN YOU NAME IT?

HINT:
You use me everyday at work, holding things together.

This object has been magnified 100x with our in-house Scanning Electron Microscope (SEM).

If you think you know what you're looking at send an email to marketing@sealcorp.com or **post on our facebook page**. All correct answers will be placed in a drawing for a **\$100 dollar Visa Card** and the winner will be announced in the October Issue of the Consultant. Please include name, company, address, city, state, zip and email address.

