Lloyd Layman, Meet Richard Parmalee

Two icons of fire protection. One a fire chief, the other an engineer. They lived in two separate times. They never could have met, but I wonder what would have happened if they had? If we had a time machine to go back and make that happen perhaps our entire profession would be different today.

We don't have that machine, so perhaps we need to use another artificial device that helps us projects history over the passage of time; visioning. In short, we can conceptualize about what might have happened if we took Fire Chief Lloyd Layman's theory of for fog nozzle firefighting and incorporated that into sprinkler system technology in the early days of the creation of automatic fire sprinkler technology.

But, there's much more. Maybe we don't have to speculate. What if it has already happened? Damn, we missed another chance for making a prediction didn't we? I cannot rest on that statement, however, because few people in our profession know what I am talking about. If you already know what I am referencing, you are likely one of those with an insatiable curiosity and you must read a lot of article. Secondarily, if you are one of those with a tendency to be an easy adopter, you should continue.

Just to refresh everyone's memory, Lloyd Layman was a Fire Chief that pioneered two fundamental documents in the fire service. The first was called "Attack and Extinguishing Interior Fires". The second was entitled "Firefighting Tactics and Strategy". Most of his work was done in the late 1930s and early 1940s. For decades his methods were the standard for teaching individuals how to fight fires in structures. His texts are classics.

His work on the use of fog streams was based upon a simple theory. He theorized that finely divided water droplets interjected into a fire environment would result in extensive production of steam. The steam was the result of converting the water from a liquid to a vapor, thereby absorbing huge amounts of British Thermal Units (BTU). He theorized that under certain circumstances the use of fog stream was a very effective manner of extinguishing fire in the setting of a structural fire.

Unfortunately, Richard Parmalee probably never saw a fog nozzle operated by a firefighter. Most of the tips in those days were straight bore. He was busy hooking up pipes on which there was devices that would hold water at bay until a feasible link released the water. Interestingly enough, the same theory Lloyd Layman used, which was maximizing the use of the latent heat evaporation, also applied as the "spray" produced by sprinklers, suppressed an incipient fire.

In another unique "paralleling" of concepts Sprinklers resulted in a fire stream being more or less classified by the amount of gallons per minute that could be produced. We called that fire flow when it was provided by hand held nozzles. A sprinkler was more or less classified by having so many gallons of

water distributed over a specific number of square feet. That was called sprinkler design density. One was manual, one was automatic.

Now for the update. Water fog has now come to fire "sprinklers". At one level I hesitate to call these new systems "sprinklers" because they are not devices that sprinkle anything. They are devices that activate like a sprinkler as a result of having heat from a bulb, but come out of the nozzle as a finely divided mist perform under extremely high pressure. Once activated these high pressure systems create an interior atmosphere that is not unlike the old "indirect" attack proposed by Layman. The droplet produced by these systems are so small that heat can be absorbed providing for rapid t conversion to steam.

What I am describing is not just a theory. It actually is being done right today. These types of systems are used extensively on ships, such as ocean going cruise liners. Digressing for a moment, the interesting corollary here is that much of the research done by Chief Layman was conducted aboard ship also, but that's another story. What is important to note is that the technology is not science fiction; it's the science in action today.

Where, you asked? That's a legitimate question. I suspect that there will be many readers that are skeptical at this point because they have seen such a system. If you were to go to Europe you would have a better chance of gaining that experience. Most of the systems are in that part of the world for a simple reason. Most of the companies that have developed this technology are European based. Your second best chance would be if you go onto one of those cruise ships because many major cruise companies are using high pressure systems.

My personal experience in these systems involves seeing them in hotels, airports, shopping centers and tunnel protection in Europe. The system I am writing about today is called Hi-Fog and is being developed and distributed by a Finish company. The company is called Marrioff. Another area where this type of system is making inroads is in the protection of libraries and museums.

These systems are not based on the traditional method of water supply, nor are they supported by fire department operations in the same fashion. They have a different set of design principles and have a unique set of pros and cons.

Let's start with the business end of the system; the head. If you look at a traditional "sprinkler" head it puts out droplets and relatively low pressure use of something like between their designed minimum pressure and about 150 psi, when supplied with a fire department support. The droplets are usually in the area of 10mm in diameter. These mist system heads are designed to put out water at two levels. They operate very much like conventional sprinklers in that there is a fusible element. However, when they are activated they go through two pressure stages. The first is low pressure discharge which is

about 150 psi. The droplet size is about 0.1 mm. The system functions on low pressure for a few moments.

Then the system activates a high pressure system. It can be by a cylinder or a pump. It produces a pressure of about 3000 psi. The high pressure version produces droplets of 0.01 mm. These can best be defined as "micro" droplets. They create an extremely large surface area to absorb heat. The low pressure mist puts out a smaller discharge that covers a basic area, somewhat like a conventional design density pattern. But when head is put under high pressure the heads produce an almost "cloudlike" atmosphere that entirely fills up a compartment.

Now to the piping. The piping is not what is used in contemporary sprinklers either. It is high pressure tubing. It ranges in diameter from 12mm up to 60mm. The heads are attached to the tubing with high pressure fittings, equipped with flare fittings. They are actually tested at 4 times the operating pressure on the system, which is a severe test.

The piping goes back to a "unit" that provides water and pressure. These units are either put together with bottles of compressed air and water; or they are designed with high pressure pumps and a water source. In both cases, the high pressure is provided by the system and never relies upon the use of conventional fire department connections for support.

A self-contained unit can hold up to 40 gallons of filtered water and a tank of nitrogen. The water is delivered by the opening of a valve that provides pressure to the water tank.

The system can be designed to be charged all the time like a conventional system, or they can be designed to have a smoke detector or some other device in the system. When operating as a pre-active system, the design is tied together with an alarm panel to provide third party notification.

One interesting aspect of this technology is that it combines the best features of the effects of water on a fire by creating a maximum amount of steam production with the penetrative qualities of a gas. The fire is not "sprinkled" on, it is surrounded by a mist cloud that goes everywhere that air can flow. Reportedly the system uses 90% less water in controlling a fire than a conventional sprinkler system.

If we could bring back Lloyd Layman and Richard Parmalee and could set up a demonstration fire using one of these high pressure systems, I'll bet you there would be some high fiving going on between those two venerable trend setters. I cannot help but believe they would both get it. Again, that won't help. I will suggest that sometime in your fire career future you will get a chance to see the technology performed.

As this technology evolves, it is my opinion that it is going to change some of the solutions we use to solve fire problems within different occupancy groups. It is a system that may overcome some of the problems we have with retro-fit installations. It may well serve as a solution to limited water supply areas. It avoids the cost of the excessive charges being placed on water meters by water companies. Lastly, it may actually address the proverbial mitigation of water damage being one of the biggest issues.

There is only one thing I can suggest that fog will not do. It will not go away. As long as water converting to steam is part of the suppression of fire, technology will continually find a way to do it better.

For more information on the water misting system go to: the website http://www.Marioff.com. Marioff, Inc. has offices in the United States in both Linthicum Maryland and Vacaville, California.

You can expect to start seeing these systems emerge in the future. Don't be caught unawares. I'll bet Keith Royer would like this system too!