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Energy Savings Project Exposes Huge Risk in Hospital

By **Bill Holmes, P.E.** September 18, 2013 10:34:58 am[Email](#)[Print](#)

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I had been in the tunnel from the boiler house to the hospital a number of times during a recent energy conservation project and, although there was a fire door to isolate the two buildings, it was always propped open. George was the administrator of the hospital and I had worked with him since Mike, one of his board members, had recommended me to help the hospital reduce their substantial utility costs. Mike was a local contractor, a county commissioner and also on the board of a regional mental health hospital where I had worked.

George was a short, stocky man who smoked nasty smelling cigars in his corner executive office. He always left his bathroom door open with the exhaust fan running to try to keep the smell out of the rest of the building. I imagine as the man running the hospital he wasn't anxious to broadcast that he was a cigar smoker. Anyway, he was apparently a very effective administrator who was doing a good job running the hospital.

Every time I visited George I was amused to observe his two assistants, who sat right outside his office door about six feet apart. One was always wearing a sweater with an electric heater under her desk, and the other a short-sleeve blouse with a fan on her desk. That's what it took to make them comfortable and they needed to be comfortable to do their job effectively. In spite of all of the articles that have been written about reducing space temperatures during heating and increasing them during cooling to save energy, I knew that attempting to save energy in large buildings by making people uncomfortable was an unfortunate myth originated and perpetuated by those who obviously don't understand how large facilities use energy. It has never been a part of any of our projects.

I had requested a meeting with George to voice my concern about the practice of leaving the fire door in the tunnel open. A minor incident in the boiler house could quickly become a huge problem in the hospital. He listened and was interested but was a busy guy and didn't do anything about it immediately. Within a day or two, however, I got a call from him asking me to come down as soon as I could, and I definitely detected some fear in his voice. He explained that a welder had been working in the boiler house, caught a rag on fire, and the smell of smoke had come into his office, more than a city block away. He wanted to talk about the tunnel and the fire door.

I went down the next morning to investigate. I wore old clothes, took a flashlight and went through the tunnel under the street and into the crawl space which was about 5 ft. high in most areas. All of the pipes from the energy systems in the boiler house plus water, sewer and electrical conduits ran through the tunnel to the crawl space, then turned 90 degrees upward and penetrated the concrete floor slab into the hospital. During initial construction, perhaps 250 to 300 pipe sleeves had been put in place before the concrete slab was poured. When the pipes and conduit were installed, they ran through these openings, then the holes were supposed to have been sealed with a fireproof material.

I went to the first opening and looked right through it into the hospital. The hole had never been sealed. Okay, one out of 300. I guess those things happen. So I went to the next one, no sealer. And the next, and the next. The original contractor had neglected to seal the penetrations more than 20 years before, and no one had caught the omission. No way. Impossible. Final inspections, punch lists, acceptance of

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Author Bio

**Bill Holmes, P.E.**

Bill Holmes, P.E. founded Holmes Energy LLC www.holmesenergy.com and developed the AutoPilot Monitoring-Based Commissioning (MBCx) System in 1979. He has a B.S. and M.S. in mechanical engineering and has done additional coursework and research for his PhD. He is a former Purdue professor and taught for several years in the Continuing Education in Energy Management Program at the University of Wisconsin.

Bill has produced savings from 20% to, in a few projects, more than 50% from low-cost, no-cost changes in management, operation, maintenance and control alone in all types of facilities including Industrial Plants owned by Fortune 500 Companies.

He is the recipient of a DOE Award for Energy Innovation and was the Indiana Energy

the work. Surely other smells over the years?

The reason George smelled the smoke from the welder's rag was that it traveled from the boiler house, through the open fire door, through the tunnel to the hospital crawl space, up through an unsealed pipe penetration in the floor and through his office to his restroom exhaust fan. And when he smelled the smoke, I hope he was sitting on his toilet because it probably scared the you-know-what out of him. It would have me. This disaster waiting to happen had been there for more than 20 years. Fumes from an explosion or fire in the boiler house would have been immediately sucked throughout the hospital and could have killed or seriously injured a lot of people. How could this be possible?

Testing of airflows and pressures in buildings is often done with smoke candles or bombs. I couldn't use smoke in a hospital so I went to the ice plant and bought a chunk of dry ice. I hadn't tried it before but I had children involved in theater and I knew that by dropping dry ice in water you could get this really neat fog to spread across the stage. I thought I would try it out in the hospital. I bought a chunk of dry ice at the ice plant, went to the boiler house, put some water in a bucket and dropped in a piece of the ice. Sure enough this fog began to rise out of the bucket. But it didn't just drop to the floor. It followed the air currents heading for the tunnel. This was simple. All I had to do was follow the fog.

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Manager of the Year in 1990. He has published numerous papers and been making presentations on his projects and methods for more than 25 years. Bill is a sculptor, a writer and a regular contributor to Sustainable Plant.

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