In the Senate of Pennsylvania
Veterans Affairs and Emergency Preparedness Committee

PROPOSED TESTIMONY OF JOHN H. MORLEY, JR.

Re: SB 1178
Amending Title 35 (Health and Safety)
of the Pennsylvania Consolidated Statutes

Thank you Chairman Vulakovich for the opportunity to testify in regards to SB 1178.

ABSTRACT

The design and installation of life safety fire protection equipment has the complexity of medicine. At this time a license is required to paint someone else's fingernails but no license is required to design and install life safety fire protection equipment. The consequence to the Commonwealth is reduced public safety.

MY BACKGROUND

I began working in the industry in 1978. My first job was operating two *Landis* machines simultaneously, fabricating system pipe. I went into business for myself in 1991. I personally sell, design, install, repair, inspect & test water based fire protection sprinkler systems and some special hazard systems. I have worked in twelve (12) Pennsylvania counties. I have the highest NICET certifications in Water-Based Systems Layout[1] and Inspection & Testing of Water-Based Systems[2]. I am also NICET Certified Level II in Special Hazards[3]. I have Backflow Certifications from the NEWWA and ASSE. I am also OSHA 30 Construction Safety certified. I have licenses to design and install fire protection systems in the states of Maryland, Delaware and New Jersey.

The tipping point for my advocacy came in 2010 when two property owners asked me to submit false inspection reports.

[1] I passed every Work Element except Land Survey, 69 of 70 Work Elements.
[2] I passed all 74 Work Elements.
[3] I passed enough Work Elements to reach Level IV (highest).

NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES

The National Institute for Certification in Engineering Technologies (hereinafter "NICET") certifies the competency of individuals working in construction related disciplines. Certification includes passing a rigorous standardized exam, verification by supervisors of actual work experience, recommendations by industry experts such as Registered Architects, Professional Engineers or Authorities Having Jurisdiction (hereinafter "AHJ") that a candidate possesses competency and ethics, participation in a "major project", amongst other requirements.

INTERNATIONAL CODE COUNCIL

The International Code Council (hereinafter "ICC") publishes the International Building Code (hereinafter "IBC"), International Fire Code (hereinafter "IFC") and International Residential Code (hereinafter "IRC") amongst other codes. The IBC determines **when** the installation of life safety fire protection equipment is required.

NATIONAL FIRE PROTECTION ASSOCIATION

The National Fire Protection Association (hereinafter "NFPA") publishes hundreds of standards that determine **how** life safety fire protection equipment is to be designed, installed, inspected & tested. NFPA 13 guides the design and installation of water-based systems. NFPA 14 guides the design and installation of standpipes. NFPA 20 guides the design and installation of fire pumps. NFPA 25 guides the inspection and testing of water based systems, to name just four of the most referenced standards in our profession.

AMERICAN WATER WORKS ASSOCIATION

The American Water Works Association (hereinafter the "AWWA") publishes manuals regarding the design and installation of Public Service Water Mains and Cross-Connection Control, amongst other topics. AWWA M14 *Recommended Practice for Backflow Prevention and Cross-Connection Control* guides the design, installation, inspection & testing of Backflow Prevention Assembly's.

CURRENT STATE OF THE PROFESSION

I have witnessed dozens of new fire protection equipment installations that 1) do not meet NFPA standards and will not perform as expected, 2) lacked required test equipment and could not be tested or 3) lacked other required equipment, malfunctioned and caused property damage. These violations of NFPA standards were the result of **negligence** on the part of incompetent people.

I have witnessed other installations that in no way resembled the approved drawings. These violations were the result of intentional and willful **fraud** by those who I consider criminals.

I. Pennsylvania

Barclay Friends was a Light and Ordinary Group I Hazard, Institutional use facility "protected" by two water based wet pipe fire protection sprinkler systems and two water based dry pipe fire protection sprinkler systems. On my own volition I reviewed construction documents including technical drawings and hydraulic calculations. The Personal Care Unit design violated NFPA 13 requirements for design density and size of hydraulic design area and failed to protect small closets. The Attics were incorrectly calculated and used small orifice sprinklers in violation of NFPA 13. The small orifice Attic system sprinklers were at risk of being blocked and obstructed by dry pipe system scale (debris). In short the pipe sizing for three of the four systems was too small to deliver the required water. **A woefully inadequate one inch "main" pipe supplied 278 sprinklers in the Personal Care Unit.** A fire originating in the Personal Care Unit or in any attic most likely would have overwhelmed the fire protection equipment, resulting in the total loss of the building and a threat to life. See Appendix A, my Findings of Fact.

36 North 3rd Street is 4 story Light Hazard, mixed use facility protected by a water based wet pipe fire protection sprinkler system, manual standpipe and electric fire pump. After a fire in this building I was asked to replace a fused sprinkler and return the system to service. While I was working the property owner asked me to "certify" the system. I could not certify the system because 1) the fire pump was disabled and taken out of service, 2) the standpipe violated several NFPA 14 requirements, 3) mechanical closets and washer/dryer closets were not protected by sprinklers in violation of NFPA 13R, and 4) no backflow Prevention Assembly existed. I subsequently learned that the standpipe was installed without a proper permit. The property owner attempted to **bribe** me to certify the system. In addition I witnessed what appeared to be a bribe of a fire alarm system worker. **Every certification of this property is suspect**. See Appendix B, my October 5, 2016 writing.

Safeguard Self Storage is a 3 story, Ordinary Hazard Group I, self storage facility protected by a water based wet pipe fire protection sprinkler system. I was asked to confirm the veracity of a Violation Notice issued by the City of Philadelphia. On the 2nd floor the contractor installed sprinklers at 400 square feet, double the spacing that was approved. In other words, the contractor **installed only half of the required sprinklers**. Standard coverage sprinklers were installed not the required, approved and appropriate U.L. Listed **extended** coverage sprinklers. Floor and ceiling obstructions to the sprinkler spray patterns were present. **This system will not perform as expected**. **Installing only half of the approved sprinklers constitutes fraud in my opinion**. See Appendix C, my November 25, 2008 NOTICE.

Mercy Hospice is a 4 story Light Hazard, Residential facility for homeless woman protected by a water based wet pipe fire protection sprinkler system and electric fire pump. The owner asked me to Inspect & Test a valve wherein I discovered a closed gate valve in the street. **The system had no water supply**. **The contractors who "Inspected & Tested" the system fraudulently "certified" that the equipment was in service and functioning.** See Appendix D, my December 22, 2014 IMPORTANT NOTICE

"Old Storage West Building" is a 5 story Ordinary Group I Hazard, Self-Storage property protected by a water based wet pipe fire protection sprinkler system, dry pipe subsystem, automatic standpipe and electric fire pump. I have performed Inspection & Testing in this building. The original fire pump was replaced with **a smaller pump than identified on approved drawings**, an electric Phase Converter was installed in violation of NFPA 20 and unprotected areas exist.

"New East Office Building" is a 5 story Ordinary Group I Hazard, Self-Storage property protected by a water based wet pipe fire protection sprinkler system, outlawed dry standpipe and electric fire pump. I have performed Inspection & Testing in this building. An undersized 4 inch supply to the fire pump prevents the pump from reaching the NFPA 20 required 150% of rated capacity. The original underground supply was 10 inch. **The performance of this system will be severely compromised**.

"Factory Building" is an 8 story above ground, Ordinary Hazard Group I, self storage facility protected by a water based wet pipe fire protection sprinkler system, a two riser manual standpipe and 90 year old electric fire pump. I was asked to legalize an unauthorized standpipe installation and I have subsequently performed Inspection & Testing and

repairs. **A Fire Protection Contractor intentionally and willfully disabled the fire pump in an attempt to force the owner into hiring them to install a new fire pump. In my opinion the contractor is guilty of risking a catastrophe.**

1900 Kitty Hawk Avenue is a Light Hazard, Business Use addition to Factory and Industrial Group 1 use building protected by a new water based wet pipe fire protection sprinkler system. I was asked to complete the system installation. **Before** the underground water supply had been installed and the aboveground pipe completed, the original contractor **certified** that the installation of the system was complete and in service. **This contractor is guilty of risking a catastrophe.**

Holy Protection Monastery is a 3 story Light Hazard, mixed use property protected by a water based wet pipe fire protection sprinkler system, two anti-freeze subsystems, one automatic standpipe and an electric fire pump. I was asked to remedy malfunctioning equipment. Essential equipment was not installed on the antifreeze subsystems (expansion tank, test valves, etc.), **the antifreeze was field mixed and flammable**, the installing contractor installed main pipe that was smaller in size than designed and approved, amongst other deficiencies.

New World Shopping Center is an Ordinary Group II Hazard, Mercantile Use Group property protected by two water based wet pipe fire protection sprinkler systems. I was asked to perform Inspection & Testing one year. **Exposed CPVC is installed in violation of it's UL Listing**, new partitions obstruct sprinklers thus creating unprotected areas, amongst other deficiencies.

Asian Shopping Center is an Ordinary Group II Hazard, Mercantile Use Group property protected by a water based wet pipe fire protection sprinkler system. I modified a tenant space in the Center. Non braided, non Listed corrugated flexible pipe is installed with kinks so severe that **water will not discharge** if the thermal response of the sprinkler is activated.

118-120 North 9th Street is an Ordinary Hazard Group II, Mercantile use building protected by a water based wet pipe fire protection sprinkler system. The system was installed **without** required and essential test equipment (Main Drain and Inspector's Test Connection).

Disabled, out of service and impaired systems are prevalent throughout the Commonwealth. At least once a year I encounter a system wherein a main control valve is closed rendering the life safety fire protection equipment impaired, disabled and out of service. In all cases the property owner was unaware of the status of their system. The testing of a backflow prevention assembly is performed under a no flow condition therefore requires closing the system side control valve. The valve closures I have witnessed are most likely the result of a sprinkler fitter **failing to re-open the valve after a test**. In the past eighteen (18) months I have encountered three (3) disabled systems. You can conclude that hundreds if not thousands of properties in the Commonwealth are without fire protection at any given time because of an incompetent sprinkler fitter.

Tamper switches installed incorrectly and therefore **not sending a supervisory signal to a Fire Alarm Control Panel** is why so many property owners do not realize that a valve is closed and fire protection equipment is impaired, disabled and out of service. Almost every tamper switch I encounter is installed incorrectly.

II. New Jersey

Riviera at East Windsor (Clubhouse) is a Light Hazard, Assembly use, protected by a water based wet pipe fire protection sprinkler system in the basement and a water based **dry** pipe fire protection sprinkler system in the attic and 1st Floor. During Annual Inspection & Testing I observed material design and installation errors. The dry pipe attic system violates NFPA standards by improperly elevating sprinklers, hydraulically calculating an under sized design area, failed to calculate minimum sprinkler pressure of 20 P.S.I. In addition the contractor installed a 4 inch underground water supply instead of the designed and approved 8 inch underground water supply. **This "*fully protected building*" will be a total loss in the event a fire originates in the attic**. See Appendix E, my August 24, 2017 FIRE PROTECTION DESIGN ERROR NOTICE. The guilty contractor has been designing and installing non-compliant systems in the Commonwealth for at least fifteen (15) years.

Kent Avenue Apartments is a 4 story Light Hazard, Residential Use facility, protected by a water based wet pipe fire protection sprinkler system, manual standpipe and electric fire pump. I performed Inspection & Testing at this building. Incorrect sprinklers were installed in the corridors **rendering half of the corridors unprotected**. The guilty contractor has a principle place of business in Pennsylvania and performs most of his work in Pennsylvania.

SEABOX is a large Factory and Industrial use facility protected by multiple water based wet pipe fire protection sprinkler systems. While renovating the system of a 2 story Business Use space within the building, I discovered that the new office system was **never connected to the water supply**. The guilty contractor is out of business.

CAUSE

In the 1960's and 70's fire protection design had **three** levels of scrutiny. **First**, the insurance companies indemnifying against fire, conducted plan review and commissioning of new systems. Almost every insurance company had higher more stringent standards than NFPA. **Second**, most property owners hired engineers to oversee the design and installation of new systems. These engineers also conducted plan review, routine inspections as work progressed and took part in commissioning new systems. **Third**, AHJ's perform plan reviews and inspections.

Today, unfortunately private property owners have successfully bullied most insurance companies into abandoning their standards. Very few private properties submit drawings and calculations to Insurance Companies for review and approval. Only municipal property owners and private owners of very large buildings routinely hire third party engineers to oversee the design and installation of new systems.

In most private sector construction the only scrutiny of the design and installation of new systems is by the AHJ. In most municipalities qualified Engineers make plan reviews and issue Building Permits but do not visit jobsites to confirm that the installed system matches the approved drawings. Site visits and commissioning of life safety fire protection equipment is pushed off to Building Inspectors, who with all due respect are not trained in the science of fire protection and not qualified to inspect fire protection equipment. Some counties make no attempt at oversight whatsoever. In 2009 I relocated one hundred twenty (120) sprinklers at one property in Schuylkill County and the AHJ did not even want to know my name.

CONCLUSION

SB 1178 is a registration of fire protection contractors not a licensing of contractors and therefore **will not** increase public safety in the Commonwealth.

However, HB 670 requires that licensed fire protection contractors employ at least one individual with a **reasonable** amount of competency and expertise. The HB 670 mandate for a subject matter expert, the Compliance Agent to verify that new system installations conform to the approved technical Drawings and Hydraulic Calculations will go a long way to ending the negligence and fraud I previously described. The other U.S. Commonwealth's Virginia, Kentucky and Massachusetts all uniformly license fire sprinkler contractors similar to the way HB 670 would. **HB 670 will improve public safety throughout the Commonwealth**.

QUESTIONS

Findings of Fact regarding Water Utility Fire Flow, Approved Contractor Fire Protection Drawings and Approved Hydraulic Calculations.

at

Barclay Friends
700 North Franklin Street
West Chester, PA 19380

by

JOHN H. MORLEY, JR.
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Philadelphia, PA 19147
(215) 389-1768
NICET Level IV[1] (highest), Water-Based Systems Layout
NICET Level III[2] (highest), I & T of Water-Based Systems
NICET Level II[3], Special Hazards
NEWWA Certified Backflow Tester, No. 4725
ASSE Certified Backflow Test & Repair, No. 25614
OSHA 30 Hour Safety, No. 14-602008847
New Jersey Fire Equipment Contractor, P01324
Delaware Fire Sprinkler Contractor, FLS-0213
Maryland Fire Sprinkler License, MSC-349

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[1] I passed every Work Element except Land Survey, 69 of 70 Work Elements.
[2] I passed all 74 Work Elements.
[3] I passed enough Work Elements to reach level IV (highest).

ABSTRACT

On Thursday, November 16, 2017 a fire at Barclay Friends (hereinafter "THE FACILITY") killed four (4) people, injured twenty seven (27) people and totally destroyed the facility. The facility's "active" fire protection equipment failed to protect life and property[4]. I have undertaken a prima facie review of construction documents to determine why the "active" fire protection equipment failed[5]. Below are my Findings of Fact.

MY BACKGROUND

I began working in the industry in 1978. My first job was operating two *Landis* machines simultaneously, fabricating fire protection system pipe. I went into business for myself in 1991. I personally sell, design, install, repair, inspect & test water based fire protection sprinkler systems and some special hazard systems. I have worked in twelve (12) Pennsylvania counties. I have the highest NICET[6] certifications in Water-Based Systems Layout and Inspection & Testing of Water-Based Systems. I am also NICET Certified Level II in Special Hazards. I have Backflow Certifications from the NEWWA and ASSE. I am also OSHA 30 Construction Safety certified. I have licenses to design and install fire protection systems in the states of Maryland, Delaware and New Jersey. **Pennsylvania does not require a license to design and install fire protection equipment.**

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[4] This review and comment will not include the facility's "passive" fire protection.

[5] I stopped my review at a point where I confirmed that fire flows were inadequate and the fire protection sprinkler system design included enough design error to be significantly impaired.

[6] NICET stands for the National Institute for Certification in Engineering Technologies.

ARCHITECT OF RECORD

The Facility Architect of Record was NBL Associates (hereinafter "NBL"), 55 Country Club Drive, Suite 204, Downingtown, PA 19335, (610) 873-9884. NBL used the 1993 BOCA National Building Code (hereinafter "BOCA") as the basis of design. NBL designed a 5A[7] Construction Type building. The facility had a Basement, 1st Floor, 2nd Floor and Attic. The 1st and 2nd floors were supported by composite wood joist. An unsprinklered combustible concealed space existed between the basement and 1st Floor and between the 1st and 2nd Floor. The roof, sloped 6:12, was supported by wood trusses.

NBL designed three distinct units, Skilled Care, Administration and Personal Care. NBL correctly determined that the Skilled Care Unit constituted an Institutional-2 (hereinafter "I-2") use and occupancy. NBL dubiously determined that the Personal Care Unit constituted an Institutional-1 (hereinafter "I-1") use and occupancy. See BOCA Section 308.0, *et seq.*, page 21-23. Because of the facility's construction type and quantity of occupants the design and installation of an NFPA 13[8] compliant automatic fire suppression system was required for both the I-1 and I-2 use and occupancy. See BOCA Section 904.6, *et seq.*, page 85 & 86. NFPA 13-1991 Edition (hereinafter "NFPA 13") was to be applied. See Appendix A, Referenced Standards, page 323. I did not find evidence that the entry doors to the Resident Rooms were automatic or self closing.

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[7] Type 5 Construction permit's the use of combustible construction materials and has the lowest fire resistance ratings allowed in the United States.

[8] An NFPA 13 system is expected to provide protection for life and property. NFPA 13 systems must be designed and installed by knowledgeable and experienced personnel.

NFPA classified the Facility as being a Light Hazard (nursing or convalescent homes). See NFPA 13, Section A-1-4.7.1. An Area/Density or Room Design method of hydraulically calculating systems could be used, See NFPA, Chapter 5. **No BOCA or NFPA exception existed that permitted the Facility's automatic fire suppression system to be designed and installed pursuant to NFPA 13R**[9].

WATER UTILITY FIRE FLOW

Water utilities in Pennsylvania are regulated by the Public Utility Code and 52 Pa. Code § 65.1, et seq. At the time Barclay Friends was constructed the water utility was the Borough of West Chester. Subsequently the water main infrastructure was purchased by Aqua. "The design of the water plant of the utility **shall** conform to **standard acceptable engineering practices**. It **shall** be designed so as to provide reasonably adequate and **safe** service to its customers and shall conform to the requirements of the Department of Environmental Resources which concern sanitation and potability of water." See 52 Pa. Code § 65.17. Standards of design. (a) *General*. "The quantity of water delivered to the distribution system from total source facilities should be sufficient to supply adequately, dependably and **safely** the total requirements of all customers under **maximum** consumption and should be determined so as to maintain the specified pressures as required by § 65.6." See 52 Pa. Code § 65.17. Standards of design. (e) *Water supply requirements.*

[9] An NFPA 13R system is expected to prevent flashover in the room of fire origin and to improve the chance for occupants to escape. The protection of an NFPA 13R system is less than an NFPA 13 system. NFPA 13R applies primarily to Residential use and occupancy less than four stories. NFPA 13R allows a lower hydraulic design density, omission of sprinklers in combustible concealed spaces, small closets and small bathrooms. *

The American Water Works Association publishes AWWA Manual M31 "Distribution System Requirements for Fire Protection" (hereinafter "M31"). M31 identifies several standards for determining Fire Flow. Fire Flow is defined as the total quantity of water (inside and outside of a structure) necessary to fight fire, available at 20 P.S.I.

The International Fire Code (hereinafter "IFC") requires a Fire Flow of 5,250 G.P.M./4 hour duration for unprotected (no interior fire protection equipment) and 1,500 G.P.M./4 hour duration for protected structures of 5A construction and Institutional Use.

The Insurance Services Office (hereinafter "ISO") requires a Fire Flow of 4,000 G.P.M. for unprotected (no interior fire protection equipment) and only the total hydraulically calculated demand of the interior fire protection equipment[10] for protected structures of 5A construction and Institutional Use[11][12].

GENERAL CONTRACTOR

The General Contractor was C.Raymond Davis & Sons, Inc., (hereinafter " the GC") P.O. Box 157, Kimberton, PA 19442 (610) 933-8908. In order to omit sprinklers in the combustible concealed spaces the GC promised to install 5/8" GWB on the underside of the composite wood joists and to fill the space with non-combustible insulation. See July 28, 1997 GC writing.

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[10] The Hydraulic Calculations include a nominal amount of water for outside hose streams.

[11] The ISO identifies the Construction Type as "Class 1 (Frame)" and the "Occupancy Combustibility Class" as "C-2 (Limited Combustibility)"

[12] The ISO fire flows identified here do not include Fire Flows for any exposures that may exist.

FIRE PROTECTION CONTRACTOR

The Fire Protection Contractor who designed and installed the water based fire protection sprinkler system at the facility was Marco Fire Suppression Specialists (hereinafter "MARCO"), 320 Commerce Drive, Exton, PA 19341[13], (610) 363-2233. The designer of the system was **Wendy Vess**. The hydraulic calculations were performed by **Donald Lee Vess**. The work was reviewed and approved, prior to the application for a building permit, by **Donald J. Kohn, P.E. No. 20798-E**.

Approved Fire Protection Drawings consisted of twelve 30 x 42 inch drawings, FP-1 through FP-11, to detail the valve, device and pipe layout. Approved Hydraulic Calculations consisted of seven (7) hydraulic design area's. MARCO designed one wet pipe system for the heated areas of the Personal Care Unit and Administration, one dry pipe system for the unheated Personal Care Unit and Administration attic areas, a second wet pipe system for the Skilled Nursing Unit and second dry pipe system for the Skilled Nursing Attics.

[13] MARCO is now Marco Protection Systems, L.L.C. located at 288 Boot Road, Downingtown, PA 19335, (610) 363-2233.

Dwg.	Area	Hydraulic Area	Sprk. Qty.
FP-1	Personal Care Bsmt.	No. 1	79
FP-2	Personal Care 1st & 2nd	No. 2	286
FP-3	P.C. Attic & Admin.	No. 3[14] & 4[15]	156
FP-3	Administration		183
FP-4	Administration Attic	No. 5	160
FP-5	Main Supply to S.N.		
FP-6	Skilled Nursing No. 1	No. 7	187
FP-7	Skilled Nursing No. 2		187
FP-8	Skilled Nursing No. 3		187
FP-9	S. N. Attic No. 3		174
FP-10	S. N. Attic No.2		152
FP-11	S. N. Attic No. 1	No. 6	152
Total Sprinklers			1903[16]

On July 9, 1997 MARCO obtained a Building Permit (Number 8301) from the Borough of West Chester (hereinafter "West Chester"), 401 East Gay Street, West Chester, PA 19380 (610) 696-1773. MARCO dubiously identified the cost of the fire protection equipment as being one hundred fifty thousand dollars ($150,000)[17]. The Non-Residential Permit Fee, based on job cost, was two thousand two hundred eighty five dollars ($2,285). See Building Permit Application and West Chester Permit Fee Schedule.

[14] MARCO determined and identified Hydraulic Areas 1 through 3.
[15] I numbered Hydraulic Areas 4 through 7 for clarity.
[16] Attic drawings include a symbol that appears to be a sidewall sprinkler at the hip pointing down to corners. MARCO however did not identify sidewall sprinklers in the drawing "head count". Total quantity of installed sprinklers may exceed 1903.
[17] MARCO may have misrepresented the cost in order to reduce the Permit Fee.

I. WATER DATA[18]

On FP-1 MARCO identified the water data as Static 90 P.S.I., Residual 20 P.S.I and a Flow of 363 G.P.M. and the underground water supply as being six (6) inch in size.

On the hydraulic calculations MARCO identified the Water Data as Static 90 P.S.I., Residual 20 P.S.I. and a different Flow of 663 G.P.M. and the underground water supply being larger, eight (8) inch in size.

MARCO identified the lineal feet of pipe, from the inside of the personal care basement to the water mains in Goshen Avenue as being only 50 feet with a tee, gate valve and 90 degree bend. The Site Drawings identified 620 feet from the building to the connection in Goshen Avenue with 90 degree bend, three (3) 45 degree bends, tee and gate valve.

I requested 1997 Water Data from the Borough of West Chester. I requested current Water Data from AQUA Pennsylvania. The Borough of West Chester denied my Request for Information. On February 19, 2018 AQUA denied my Request for Information.

II. PERSONAL CARE UNIT

MARCO incorrectly applied NFPA 13R omissions and reductions in the design of the Personal Care Section despite the BOCA requirement for an NFPA 13 system. MARCO 1) omitted sprinklers in small closets in violation of NFPA 13, 2) hydraulically calculated a density of only .081 G.P.M./Sq.Ft.

[18] Static and Residual water pressure measured in Pounds Per Square Inch or P.S.I., Flow or quantity of water measured in Gallons Per Minute or G.P.M. amongst other facts such as the date and location of the Hydrant Flow Test and weather conditions such as temperature and atmospheric pressure.

in violation of NFPA 13, 3) hydraulically calculated design areas smaller than required by NFPA 13 and 4) calculated only 12 G.P.M. flowing from the hydraulic design area sprinklers despite the NFPA 13R-1991 Edition requirement for "not less than 13 gpm per sprinkler to the number of design sprinklers".[19]

On the Area No. 2 Hydraulic Calculation Summary Sheet MARCO incorrectly identified that a "14.8 GPM/SqFt" density was used. This misrepresentation indicates a sprinkler discharge not a design density and, via a mathematical equation, an implication that the density is .1 G.P.M./Sq.Ft. On all of the other Hydraulic Areas MARCO identified a seemingly appropriate density of .1 or .15 GPM/SqFt[20]. On the Area No. 2, page 2, Summary of Sprinkler Outflows the computer program identified the actual sprinkler flows being 12.00 to 12.58 which by a simple mathematical equation[21] confirms that only a .081 G.P.M./Sq.Ft. density was actually calculated. The Area No. 2 Hydraulic Calculations failed to identify a .081 density.

MARCO designed and installed a one inch CPVC "Main" to supply two hundred eighty six sprinklers in the Personal Care Unit. See FP-2.

III. ATTICS

MARCO 1) failed to compute the true and correct distance up the slope[22] therefore designed sprinklers with various protection areas exceeding 130 Sq. Ft. in violation of NFPA 13, Table 4-2.2, for Light Hazard Combustible, Obstructed

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[19] See NFPA 13R-1991 Edition, Section 2-5.1.1 Design Discharge.

[20] Numbers in this range identify density.

[21] q or flow = (design density)(area per sprinkler).

[22] Trigonometry must be used to determine true and correct protection areas up the slope of pitched roofs or ceilings.

Construction, Note 3., 2) hydraulically calculated sprinkler protection areas less than the true and correct protection areas, 3) used small orifice sprinklers in violation of NFPA 13, Section 2-2.2.1(b) and 4) failed to protect 100% of the attic.

Shortly after the Facility was built, test work and modeling conducted at FM Global compelled NFPA to add requirements for systems under sloped (greater than 2:12) roofs or ceilings. NFPA now requires 1) sloped ceiling sprinklers to be within 12 inches of the peak, See NFPA 13-2016 Edition, Section 8.6.4.1.4.2, 2) a 30 percent increase in the hydraulic design area, See NFPA 13-2016 Edition, Section 11.2.3.2.4, 3) 20 P.S.I. minimum sprinkler discharge pressure when the distance between sprinklers perpendicular to the slope exceed 8'-0", See See NFPA 13-2016 Edition, Section 8.6.4.1.4.4, amongst other requirements.

The Attic sprinklers at the Facility were not within 12 inches of the peak, were not calculated with the increased hydraulic design area and did not have a minimum 20 P.S.I. discharge pressure.

Continued review no doubt will reveal additional design error.

UNKNOWN

Did the GC in fact fill the combustible concealed spaces with non-combustible insulation?

CONCLUSION-FIRE FLOWS

In theory, a 2½ fire hydrant hose outlet can supply 250 G.P.M. In practice, depending on the nozzle orifice, a 2½ fire hydrant hose outlet can supply 400 G.P.M. or more[23].

If Aqua supplied only 363 G.P.M. as identified on FP-1 and the interior fire protection equipment was discharging water, **no water would have been available for outside hose streams**. If the interior fire protection equipment was disabled, impaired and out of service, **only one hose stream**, connected directly to the Fire Hydrant could be used to fight the fire.

If Aqua supplied 663 G.P.M. as identified on Hydraulic Calculations and the interior fire protection equipment was discharging water, **no water would have been available for outside hose streams**. If the interior fire protection equipment was disabled, impaired and out of service, **two weak hose streams**, connected directly to the Fire Hydrant could be used to fight the fire.

If Aqua provided 363 G.P.M. the smallest Fire Department Pumper, 500 G.P.M. @ 150 P.S.I., would not have had enough water to pump. If Aqua provided 663 G.P.M. the second smallest Fire Department Pumper, 750 G.P.M. @ 150 P.S.I., would not have had enough water to pump. If a 750 G.P.M. or larger Fire Department Pumper attempted to supplement water pressure a negative pressure would have occurred in the underground water mains and **water would have disappeared**[24].

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[23] I make this statement based on my experience performing Hydrant Flow Tests and Fire Pump Flow Tests wherein I have taken Pitot Tube readings from Play Pipes connected to Fire Hydrant Hose Outlets or 2½ Fire Hose Valves connected to Fire Pump Test Headers.

[24] Principle of the Conservation of Energy.

Aqua failed to supply Fire Flow pursuant to "standard acceptable engineering practices".

CONCLUSION-FIRE PROTECTION CONTRACTOR

I. WATER DATA

A discrepancy exists regarding Water Data. Without verifiable and accurate Water Data, hydraulic calculations are only academic exercises not to be relied upon for any meaningful conclusion.

The above written not withstanding, I performed two hydraulic calculations of the Personal Care Unit wet pipe system to demonstrate the inadequacy of MARCO's design. One calculation used 663 G.P.M. as the available Flow and one used 363 G.P.M. as the available Flow. I used the correct .1 G.P.M./Sq.Ft. density, a correct room design method and correct lineal feet of a 6 inch water supply. With 663 G.P.M. available the system had a **3.25 P.S.I. system shortage**. With 363 G.P.M. available the system had a **14.48 P.S.I. system shortage**. See my Hydraulic Calculations.

Using the correct larger orifice sprinklers in the attic would have caused an increase to the demand and rendered **larger** system shortages than referenced above.

II. PERSONAL CARE

The misrepresentations on the Area No. 2 Hydraulic Calculation Summary Sheet described above is not a simple error. MARCO used the technical knowledge they possessed to intentionally and willfully manipulate the Area No. 2 Hydraulic Calculations, in order to conceal publication of the true but incorrect .081 density calculated.

The design errors appear to me to be intentional and willful. The purpose of the design errors may have been for economic reasons.

Given the totality of design errors a fire originating anywhere in the Personal Care Unit, especially the unsprinklered combustible concealed space between floors, most likely would have overwhelmed the system, resulting in the total loss of the facility and threat to life.

III. ATTICS

The larger than permitted sprinkler protection areas and incorrect hydraulic calculations mean that pipe sizing will be too small to control/extinguish a fire.

Dry pipe systems hasten corrosion of pipe and build up of scale (debris). Small orifice sprinklers are prohibited in dry pipe systems because of the potential for scale to obstruct sprinkler discharge.

Given MARCO's design errors <u>and</u> the new NFPA requirements for sloped ceilings, a fire originating anywhere in the Attic of the Facility, including the Skilled Nursing Unit, most likely would have overwhelmed the system, resulting in a total loss of the Facility and threat to life.

RECOMMENDATION

I. WATER UTILITIES

Although Pennsylvania recognizes, via Court Decisions[25], that Water Utilities have a duty to supply adequate Fire Flows the Legislature must create an **explicit unequivocal statutory mandate** for Water Utilities to supply adequate fire flows.

II. FIRE PROTECTION CONTRACTORS

The design and installation of life safety fire protection equipment is as complex as any other profession including medicine and law.

Lack of uniform licensing of fire sprinkler contractors in Pennsylvania has aided and abetted the incompetent and unethical.

The Commonwealth of Pennsylvania must uniformly license fire sprinkler contractors as every other Commonwealth and most states have done. Licensing must require employment of competent NICET certified workers, plan reviews by subject matter experts, certification by subject matter experts that new systems comply with approved drawings, penalties for repeated errors found during plan reviews or system certifications and criminal penalties for fraud.

DATE: April 29, 2018 John H. Morley, Jr.

[25]See *Doyle v. South Pittsburgh Water Co.*, 199 A.2d 875 (1964).

John H. Morley, Jr.
P.O. Box 2423
Philadelphia, PA 19147
(215) 389-1768

October 5, 2016 VIA: First Class Mail and Facsimile

Ralph DiPietro, Deputy Commissioner, Director of Operations
City of Philadelphia, Department of L & I, Facsimile (215) 686-2403
1401 JFK Boulevard, 11th Floor
Philadelphia, PA 19102-1687

RE: 36 North 3rd Street

Dear Mr. DiPietro,

ABSTRACT

In the summer of 2015 a fire occurred at the above referenced property. After the fire one of the buildings' owners, **Dominic Ward**, asked me to replace fused sprinklers, return the fire protection life safety equipment to service and perform annual Inspection and Testing of the water based wet pipe fire protection sprinkler system, standpipe and fire pump. I replaced one fused sprinkler and returned the sprinkler system only to service. For the reasons stated below I refused to perform the Inspection & Testing.

DOMINIC WARD

Upon a cursory visual inspection of the building I immediately observed violations of 1) fire codes and 2) NFPA standards throughout the building. **Dominic Ward** pressured me, via increasing the amount of money offered, to "certify" the life safety fire protection equipment while promising that he will pay me to remediate **after** I "certified" the equipment. At all times I refused to "certify" the equipment.

OBSERVATIONS

I. Fire Pump

I observed that the fire pump was disabled and out of service.

II. Certification

I read, but do not have a copy of the 2014 Philadelphia ANNUAL CERTIFICATION FOR SPRINKLER/STANDPIPE SYSTEMS for this building. The CERTIFICATION failed to indicate the disabled fire pump and had a blank comments page. In other words the Inspector for Mac Sprinkler, Inc, my brother **Timothy Morley**, failed to identify that this building had any deficiencies or impairments. My brother informed me that he was instructed by **Charles Pistorio** of Mac Sprinklers that "variances" had been granted for the disabled equipment and that he was not to indicate the impairments on the CERTIFICATION.

III. Standpipe

The Standpipe installation violates code. **Dominic Ward** informed me that Mac Sprinklers, Inc. obtained a Fast Form Permit for the design and installation of the Standpipe. As you know a Fast Form can not be used for the design and installation of a Standpipe.

IV. Sprinklers

It appears that the design of the water based fire protection sprinkler system was based on NFPA 13R. As you know NFPA 13R permits the omission of sprinklers in certain areas. I observed that no sprinklers were installed in any of the apartment Washer/Dryer Closets. NFPA 13R does not permit sprinklers in the Washer/Dryer Closets to be omitted because statistics prove a high probability of fire starting in Washer/Dryer Closets.

V. Cross Connection Control

No backflow prevention device exists on the water supply to the water based wet pipe fire protection sprinkler system or standpipe.

CONCLUSION

I. Mac Sprinklers, Inc.

Mac Sprinklers, Inc. has knowingly and willingly violated 1) fire codes, 2) NFPA Standards, 3) City of Philadelphia permitting processes and 4) Department of L & I policy. In short Mac Sprinklers, Inc. is gaming the system and L & I. You must revoke their Contractor License at once.

II. Dominic Ward

Given **Dominic Ward**'s attempt to bribe me to "certify" the equipment, all of the certifications for this building should become suspect and audited by the City of Philadelphia. Offending Contractors must be sanctioned.

III. Timothy Morley

You should take any disciplinary action against my brother that you deem appropriate and necessary[1].

IV. 36 North 3rd Street

In my opinion, given revisions to NFPA Standards[2] and equipment innovations[3] the life safety fire protection equipment in this building could be engineered and re-commissioned[4] to perform without the fire pump being in service. You must demand that the life safety fire protection equipment be re-commissioned.

Very truly yours,

John H. Morley, Jr.
NICET Level IV, Water-Based Systems Layout
NICET Level III, Inspection & Testing of Water Based Systems
NICET Level II, Special Hazards
NICET Certification Number 118 006, Expires November 1, 2018
NEWWA Backflow Prevention Device Tester 4725, Expires January 31, 2019
ASSE Backflow Protection Assembly Tester 25614, Expires January 31, 2017

Cc: File
David Perri, P.E., L & I Commissioner
Debra McCarty, PWD Commissioner
Michael E. Fink, L & I Deputy Commissioner

DIPIETRO,RALPH4

POST SCRIPT

In 2015 I informed L & I Inspector **Michael Farley** of all of the findings written above.

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[1] He has not renewed his Fire Suppression System Worker License.
[2] Especially the dramatic changes to NFPA 14 Standard for the Installation of Standpipe and Hose Systems.
[3] Hydraulic Calculation Remote Area reductions permitted by the use of quick response sprinklers.
[4] If the Philadelphia Water Department demands the installation of a backflow prevention device the life safety fire protection equipment must be re-commissioned.

John H. Morley, Jr.
P.O. Box 2423
Philadelphia, PA 19147
(215) 389-1768

November 25, 2008 VIA: First Class Mail and Facsimile

Mike Enze F (815) 301-3193
Safeguard Self Storage
3350 Peachtree Road, 17th Floor
Atlanta, GA 30326

RE: **Fox Chase** Safeguard Self Storage F (215) 342-8743
1333 Rhawn Street (**Store Number 130101**)
Philadelphia, PA 19111
NOTICE-REPORT

Dear Mr. Enze,

BACKGROUND

On October 14, 2008 Dana Brown from Commercial & Industrial Fire Unit issued a VIOLATION NOTICE, **Case Number 182297** for the above referenced property. Two pertinent comments on the VIOLATION NOTICE are "lower storage 18 inches below sprinkler head deflectors" and "Lockers may not be protected by sprinkler heads do to distance between sprinkler heads." Comments also included "spray pattern obstructed by duct work." and "Third floor Stairways" My February 26, 2008 Inspection also revealed that sprinklers were not installed at the bottom of one stairwell, under the garage doors and no heat existed in one stairwell[1].

INVESTIGATION

At the outset I would like to point out that the purpose of my annual inspection of water based fire protection sprinkler systems is to confirm that the system continues to function. It is the responsibility of the contractor who installed the system to ensure that the system is designed and installed properly. The VIOLATION NOTICE prompted me to make four (4) additional trips to the property to investigate and focus on the system's **design**.

[1] Owner must provide enough heat in all area's to prevent freezing of sprinkler pipe. Heat should be maintained above 40 degrees Fahrenheit at all times.

RESULTS OF THE INVESTIGATION

The General Contractor Island Construction, L.L.C., P.O. Box 381, Malvern, PA 19355 (610) 933-8986 apparently contracted with Phoenix Mechanical 242 Penbroke Avenue, Lansdowne, PA 19050 to install the fire protection. Phoenix apparently went out of business and Simplex Grinnell, L.P., 120 Domorah Drive, Montgomeryville, PA 18936 (215) 619-7098 completed the fire protection system.

Pursuant to the Phoenix shop drawing sprinklers were generally designed to utilize Extended Coverage sprinklers spaced 10 feet by 20 feet for coverage of 200 square feet per sprinkler. The 2nd floor sprinklers however were in fact installed with 20 feet by 20 feet spacing for coverage of 400 square feet per sprinkler[2].

Pursuant to the Phoenix shop drawing 338 Tyco EC-11[3], (TY 5137) sprinklers were to be installed. Contrary to the shop drawings, Viking (VK 530) sprinklers were in fact installed. Viking (VK 530) sprinklers are not listed for extended coverage use. In addition 2nd floor sprinklers have multiple ceiling and floor obstructions and deflectors too far from ceiling[4].

In the City of Philadelphia, an engineer reviews fire protection shop drawings for technical correctness and issues a permit upon his or her approval. A building inspector, in many instances a person with no actual experience working in construction, then visit's the site to confirm only that the sprinkler system was installed pursuant to the approved shop drawings. As I initially suspected, Phoenix did not add the storage configuration to their shop drawings[5]. The City of Philadelphia Engineer had no knowledge of the floor mounted obstructions that were to be installed. The Building Inspector is not technically astute enough to have known the ramifications of the obstructions to the sprinkler discharge.

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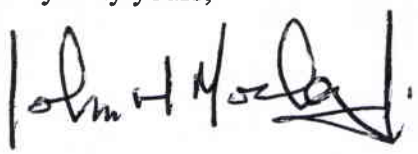
[2] For contrast Oaklane was designed for use of standard coverage sprinklers spaced 10 feet by 10 feet for coverage of 100 square feet per sprinkler.
[3] EC stands for extended coverage.
[4] In a separate writing I will provide a price to correct all of the 2nd floor conditions documented in this writing.
[5] Phoenix also failed to indicate the size of structural members.

This NOTICE-REPORT represents only a cursory technical review of the fire protection sprinkler system design. A more complete review would include independent hydraulic calculations and further scrutiny of the sprinkler spacing on the 1st and 3rd floors. I can continue to investigate and consult Safeguard on a *Time & Material Basis* if desired and necessary.

Very truly yours,



John H. Morley, Jr.

Cc: File

ENZE20

John H. Morley, Jr.
P.O. Box 2423
Philadelphia, PA 19147
(215) 389-1768

December 22, 2014 VIA: First Class Mail and Facsimile

Michael Mahoney
Mercy Hospice, Facsimile (215) 545-1872
334-36 South 13th Street
Philadelphia, PA 19107

RE: Water Based fire Protection Systems
Mercy Hospice
334-36 South 13th Street
Philadelphia, PA 19107
IMPORTANT NOTICE

Dear Mr. Mahoney,

Today, Monday, December 22, 2014 I completed the Inspection & Testing of the fire service backflow prevention device at the above referenced property. During the testing I discovered that the underground fire service gate valve in 13th Street was **closed**.

The property did not actually have fire protection[1].

I opened the underground gate valve and left the fire protection systems in service.

I request that everyone receiving a copy of this letter, investigate how valves controlling fire protection systems could be closed, without anyone knowing[2]. I would be happy to take part in any investigation.

Very truly yours,

John H. Morley, Jr.

Cc: File MAHONEY,MICHAEL
Ralph DiPietro, Department of Licenses & Inspections, Facsimile (215) 686-2403
Debra McCarty, Philadelphia Water Department, Facsimile (215) 685-4915

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[1] This is the second time and second property in Philadelphia, in three years that I have discovered a closed underground fire service gate valve .

[2] Who closed the valve? The PWD, a fire protection contractor? What did the last fire protection system certification reveal? How long has this property been unprotected?

John H. Morley, Jr.
P.O. Box 2423
Philadelphia, PA 19147
(215) 389-1768

August 24, 2017 VIA: First Class Mail and Facsimile

Rachel Rutman, Facsimile (609) 371-3589
Riviera at East Windsor HOA
114 Einstein Way
Cranbury, NJ 08512

RE: Clubhouse Attic Dry-Pipe Fire Protection Sprinkler System
114 Einstein Way
Cranbury, NJ 08512
AMENDED FIRE PROTECTION DESIGN ERROR NOTICE

Dear Ms. Rutman,

ABSTRACT

Approval of fire protection equipment design occurs at the time of the plan review of technical drawings and hydraulic calculations by the Authorities Having Jurisdiction (hereinafter "AHJ"). Acceptance of the fire protection equipment installation occurs at the time of system commissioning and is documented on the **appropriate** MATERIAL AND TEST CERTIFICATE[1]. The intention of annual Inspection & Testing (hereinafter "I & T") of fire protection equipment is to verify that the systems are in service and functioning. It is not the intention of the annual I & T to re-examine initial design and commissioning.

The above notwithstanding, I identified design and installation error during the I & T. Upon review of the Fire Protection Drawings provided by Riviera at East Windsor HOA (hereinafter "HOA") I identified and confirmed other design errors. Finally, I obtained the Hydraulic Calculations from a third party and I have confirmed yet another design error.

I am duty bound to communicate my findings to the HOA.

[1]For Underground Piping, Aboveground Piping, Standpipes, Fire Pumps, Etc.

FIRE SUPPRESSION, INC.

The fire protection systems protecting the Clubhouse were designed and installed by **Fire Suppression, Inc.** 6515 Governor Printz Boulevard, Wilmington, DE 19809 (302) 793-1118. The sole owner is a man named **Michael Demauro**. The Fire Protection Drawings (FP-1 and FP-2) were completed on September 10, 2003. General Note Number 1 on FP-2 states in whole; "*Sprinkler system to be installed in accordance with the latest N.F.P.A. No. 13*".

DRY PIPE SYSTEM PROTECTING ATTIC

A water based **dry** pipe fire protection sprinkler system protects the unheated and unoccupied Clubhouse attic constructed of combustible roof trusses 24 inches on center. The pitch of the different roofs vary from a rise of 4, 6 or 8 inches in 12 inches.

By NFPA standards, the unoccupied attic is a Light Hazard Occupancy. The density of water to be delivered by the fire protection equipment is .1 G.P.M. Ordinarily a design area of 1500 square feet is required. In this case the design area must be increased twice by 30%. Because the type of system is **dry** pipe the first design area adjustment must be made to account for the delayed water delivery. See 2002 Edition of NFPA 13, Section 11.2.3.2.5. Because of the steeply pitched roofs (in excess of 2 in 12) a second adjustment must be made to account for the opening of sprinklers **adjacent** to, but not in the actual fire area. See 2002 Edition of NFPA 13, Section 11.2.3.2.4. The design area for this system must be 2535 square feet.

The highest sprinklers must be within 12 inches of the peak. See 2002 Edition of NFPA 13, Section 8.6.4.1.4.2.

When the dimension between sprinklers perpendicular to the slope exceed eight feet the minimum sprinkler operating pressure must be 20 P.S.I. See 2002 Edition of NFPA 13, Section 8.6.2.2.1, *et seq*.

FIRE PROTECTION DESIGN ERRORS

A. SPRINKLER ELEVATION

NFPA requires that the highest sprinklers be elevated within 12 inches of the peak. All of the Attic lines were designed to exceed 12 inches from the peak. During the I & T I observed several rows of sprinklers in excess of 36 inches from the peak. The consequence is delayed operation.

B. HYDRAULIC DESIGN AREA

The fire protection drawings indicated only a 1950 square foot hydraulic design area. NFPA requires another 585 square feet of design area and another 5 sprinklers operating. The consequence is that the pipe sizing may be too small and a fire may overwhelm the system. In other words a fire in the attic space may not be contained or extinguished by the system.

Absolute conclusions can not be determined without the completion of new Hydraulic Calculations.

Hydraulic calculation design areas are determined by most remote and most hydraulically demanding areas. An actual fire in a less remote or less demanding area may be controlled by the system as designed and installed.

C. UNDERGROUND WATER SUPPLY

The fire protection drawings indicated an 8 inch underground water supply. Thus, Hydraulic Calculations were based on an 8 inch underground water supply. In fact, an undersized 4 inch underground pipe enters the basement.

I contacted the East Windsor Utilities Authority (hereinafter "EWUA") in an attempt to learn the size of the Clubhouse Fire Connection in Einstein Way. Incredibly, **Eric Windsor** of the EWUA informed me that no record of the size of the fire connection was kept by the Authority. Mr. Windsor suggested I attempt to acquire the information from the East Windsor Plumbing Subcode Official **Frank Kopac.**

Mr. Kopac informed me that his office also failed to keep a record of the size of the fire connection. Mr. Kopec instructed me to "dig it up".

The distance from the underground water mains in Einstein Way to the flange in the Clubhouse basement is 215 feet. If the underground water supply is only 4 inch for the entire distance, this system, based on the incorrect **Fire Suppression, Inc.** Hydraulic Calculations, has 5.12 P.S.I. **less** pressure available than what hydraulic calculations indicate. Even less pressure will be available for **correct** Hydraulic Calculations. The initial consequence is a reduced safety factor. The ultimate consequence will not be known until correct Hydraulic Calculations are completed.

D. MINIMUM SPRINKLER OPERATING PRESSURE

The Fire Protection Drawings indicate the distance between sprinklers perpendicular to the slope exceeds eight feet. NFPA requires a minimum sprinkler operating pressure of 20 P.S.I. The Hydraulic Calculations indicate that the sprinkler operating pressures range from 7 P.S.I. to 14.2 P.S.I. The consequence is that the pipe sizing may be too small and a fire may overwhelm the system. In other words a fire in the attic space may not be contained or extinguished by the system.

CONCLUSION

It is now my opinion, given all of the facts I have confirmed and written above, that a fire in the Attic, will more likely than not, overwhelm the system. In other words the system will fail to control or extinguish the fire. A delayed response by the local fire department could result in a total loss of the building.

The AHJ should have identified the errors and demanded correction **before** accepting the system and issuing a CERTIFICATE OF OCCUPANCY. The cost to **completely** remediate **all** of these issues now will be astronomical as compared to the initial design and installation costs. Participation by several construction trades would be required for this magnitude of remediation.

I do however recommend that the HOA be proactive and inform the AHJ of my findings.

Please advise if you want me to take any further action.

Very truly yours,

John H. Morley, Jr.
NICET Level IV (highest)[2], Water-Based Systems Layout
NICET Level III (highest)[3], Inspection & Testing of Water-Based Systems
NICET Level II[4], Special Hazards
New Jersey Fire Protection Equipment Contractor P-01324
New Jersey Fire Sprinkler System Certification Number 175795
NEWWA Backflow Assembly Technician, Certification Number 4725
ASSE Backflow Assembly Technician & Repairer, Certification Number 25614
OSHA 30 Hour Construction Safety and Health 14-602008847

Cc: File RUTMAN,RACHEL2

[2] I passed every Work Element accept Land Survey.
[3] I passed every Work Element.
[4] I passed enough Work Elements to reach Level IV (highest).