ASPE
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BALTIMORE

**Monthly Newsletter** **FEBRUARY 2022**

WWW.BALTIMOREASPE.COM

# Upcoming Meeting

**Date:** **February 23, 2022**

**Time:** **6:00pm to 8:00pm**

**Place:** Olive Grove Restaurant

**Topic:** Early Suppression Fast Response & Cloud Ceiling Sprinkler Systems

**Speaker:** Professor Ken Isman - UMD

Meeting Format
*6-6:30 Social*
*6:30-6:45 Announcements and Table Tops*
*6:45 Dinner Served*
*7:00-8:00 Speaker*

## In This Issue



## MEETING LOCATION

Olive Grove Restaurant & Lounge

**705 North Hammonds Ferry Road**
**Linthicum, Maryland 21090**
**Phone: 410.636.1385**

*Local Chapters are not authorized to speak for the Society.*
*Newsletter questions please contact Jason Eagles*

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- Ads for the year will begin in the September issue and run through the May issue.
- All ads must be paid in full prior to the advertisement being included in the newsletter.
- Advertiser must provide ads in high resolution PDF format. Logo must be provided in .jpeg format 200px wide max.

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| Size | Per Year |
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Please Contact Jason Eagles or Jeff Edwards

Make checks payable to Baltimore Chapter of ASPE. Please contact the chapter Treasurer with any questions.

Kathy Dwyer
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**Chuck Swope, PE, CPD, LEED AP BD+C**
**Vice President—Technical**

# Technical Report

We made it through another virtual meeting! Many thanks to our attendees from our January Meeting, Arc-Flash Mitigation in Fire Pump Controllers. I'm glad to see so many new names that could join us and hope that they continue to do so. February's meeting will be in-person again, since the count's indoor mask mandates have expired! Good news for those that enjoy a good crabcake.

As some of you well know, February has been designated as our chapter's Fire Protection month and we are happy that Professor Ken Isman from the Fire Protection Engineering department of the University of Maryland has accepted our invite to present again. Professor Ken will be covering two topics this time, Early Suppression Fast Response (ESFR) sprinkler systems and Cloud Ceiling Sprinkler Systems. While each one could take up several meetings, we asked him to present the most salient points of each so that we know what questions we should be asking our architect friends and other consultants.

Our speaker for February is Ken Isman, Clinical Professor in the Fire Protection Engineering department of the University of Maryland. Ken holds a Bachelor of Science degree in Fire Protection Engineering and a Master of Science degree in Business Management, both from the University of Maryland. After graduation, Ken worked for 28 years in the fire sprinkler industry helping to design water-based fire suppression systems, performing research in developing new products and design techniques for the fire sprinkler industry, and representing the industry in the national and international development of codes and standards that affect the industry. In 2014, Ken returned to the University of Maryland as a professor to teach classes in fire protection systems design, life safety analysis and entrepreneurship. He is a Professional Engineer (licensed in Connecticut) and has been elected to the level of Fellow in the Society of Fire Protection Engineers. He has received both the NFPA Standards Medal, for lifetime service to the NFPA Codes and Standards process and the SFPE Harold Nelson award for lifetime service to the SFPE.

Best Regards,
Charles J. Swope, PE, CPD, LEED AP BD+C
Vice President - Technical

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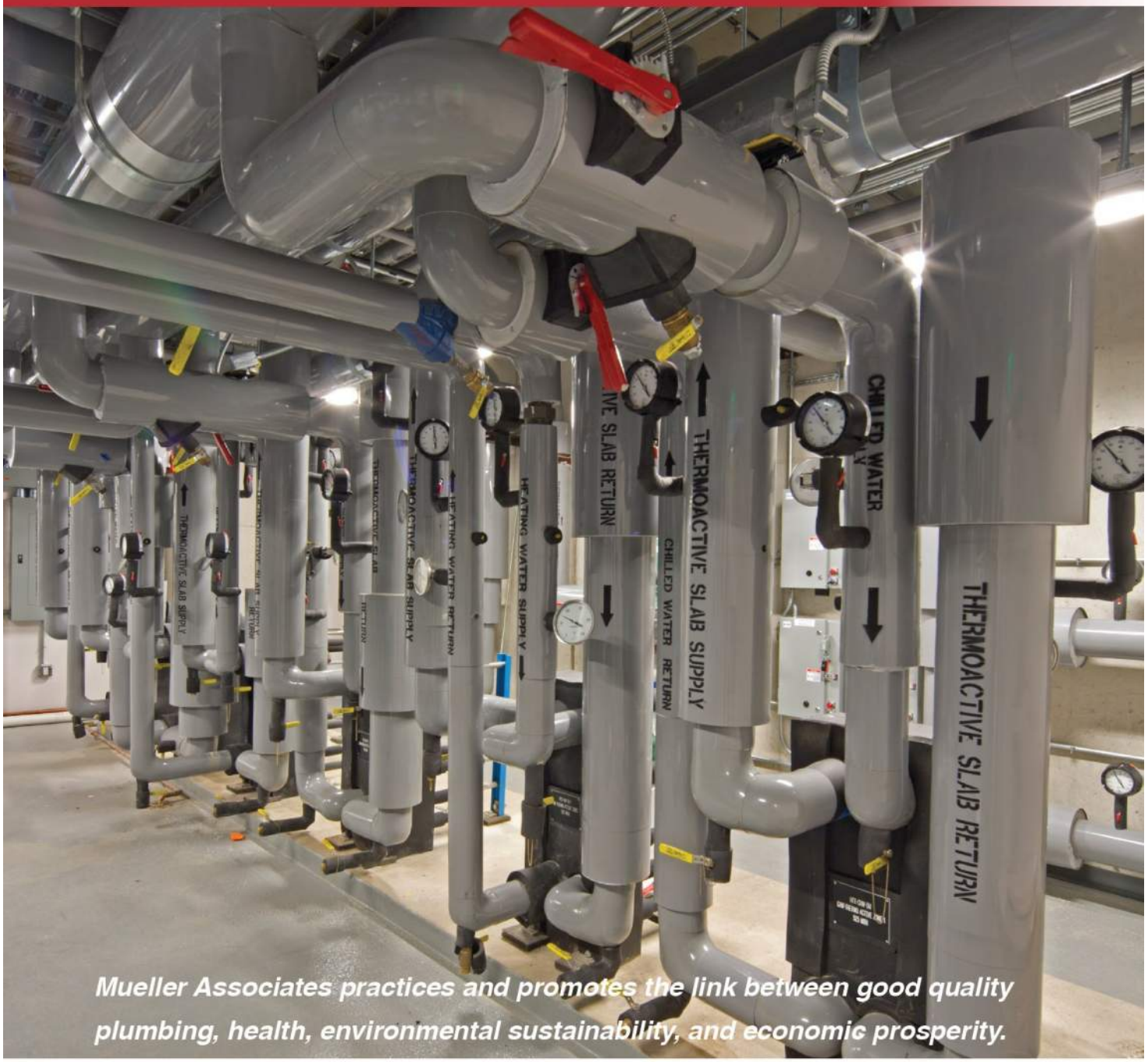


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"At no time is a booster at 100 percent flow based on Hunter's diversity curves"

"When selecting the total flow capacity, one preferred way to evaluate the operational efficiency is to use a method that can be scientifically proven, such as the 70 percent method."

"Tanks will typically be required when the manufacturer does not utilize low flow testing algorithms to detect low flow"

"New energy standards concede that reducing the speed of a pump during most of its operational time and restarting for makeup loads is more efficient than using tanks as "water storage batteries" during low-flow conditions."

** The above is taken from American Society of Plumbing Engineers design guide volume 4 chapter 4**

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# Resolving ESFR Sprinkler Obstruction Challenges

## The findings of an industry research project were used as the basis for code changes to the 2022 edition of NFPA 13.

*October 5, 2021*

Early suppression fast response sprinkler (ESFR) technology was introduced in the late 1980s. The ESFR sprinkler was touted as the replacement for in-rack sprinklers. The large orifice size and quick response thermal link are capable of delivering a previously unmatched quantity of water flux to an aggressive storage fire. In addition, ESFR sprinklers are ceiling sprinklers, thus not vulnerable to an inattentive forklift operator.

ESFR sprinkler performance came with a price. The early sprinkler design and installation standards published by the National Fire Protection Association (NFPA) and FM Global contained very rigorous obstruction requirements for the installation of ESFR sprinklers. Not only did these requirements complicate the installation of ESFR sprinklers, but they also misrepresented the sprinklers as fragile or unreliable compared to standard spray sprinklers.

However, help was on the way. In 2006, the National Fire Protection Research Foundation commissioned a multiyear research project to sort the ESFR sprinkler obstruction issue. The goal of this project was to validate the current rules for ESFR sprinkler obstructions, and if appropriate, provide data to the NFPA 13 code development committee to submit code changes to align ESFR sprinkler obstruction rules based upon scientific data.

This article originally appeared in Plumbing Engineer, a TMB Publishing publication. For more articles like this, please visit www.phcppros.com.

**Using Scientific Method to Resolve Sprinkler Obstruction Issues**

This project was unique due to the innovative use of the actual delivered density (ADD) apparatus as a scoping tool for full-scale testing. ADD testing is typically used for sprinkler listing or approval. The technology has been around since the 1990s. ADD testing allowed the examination of approximately 65 scenarios from which nine full-scale tests were selected.

ADD testing provides a methodology to identify trends and identify scenarios that may pass or fail the selected performance criteria. Given the wide range of variables included in the project scope, ADD testing proved to be a reliable and consistent tool to quickly and economically simulate full-scale test outcomes.

The work was completed in four distinctive phases, each building upon the tests conducted prior to obtain a comprehensive view of ESFR obstruction phenomena, as guided by the selected boundary conditions.

Phase 1 consisted of a literature search in which relevant research concerning ESFR sprinkler performance and obstruction criteria was collected and reviewed. Potential obstruction scenarios for the testing were also identified.

Given the infinite number of sprinkler obstruction conditions that may occur, boundary conditions for the testing were established. Survey results of NFPA 13 users worldwide showed that open web steel joists are the most commonly used structural roof system. Bridging members, which provide lateral support for maintaining stability under vertical loads, were identified as the most problematic ESFR sprinkler obstruction.

Discussions with leading steel joist suppliers indicated that the most common sizes sold are in the range of 22 inches to 36 inches in depth, with 30 inches deep being the most popular.

The obstruction created by an open web steel truss is dependent on the size of the bottom chord. The upper chord is assumed to be above the sprinkler and thus out of the sprinkler spray pattern. The web of the steel truss is minimal in size, typically

This article originally appeared in Plumbing Engineer, a TMB Publishing publication. For more articles like this, please visit www.phcppros.com.

1/2-inch-wide round or L stock and, therefore, is assumed to not influence the sprinkler discharge pattern in a significant manner.

The chords are constructed of two L-shaped members, welded or bolted together back to back. In addition, the web is attached between the two, increasing the width by approximately 1/2 inch. The width of the bottom chord is a function of the depth of the open web steel joist. Joists 22 inches to 30 inches deep are provided with chords 4 1/2 inches in width, and joists 36 inches deep are provided with chords 5 1/2 inches in width.

The characteristics of the ESFR sprinkler selected for the testing were also determined in Phase 1. Discussions with sprinkler manufacturers were conducted to aid in this selection. Upright-style ESFR sprinklers were found to be of minimal popularity; therefore, pendent-style sprinklers were selected for the testing. Regarding orifice size, K17 sprinklers were determined to be the most popular model compared to K22-K25 sprinklers. In addition, given their smaller orifice sizes and corresponding smaller droplet sizes, K17 sprinkler performance was assumed to be more biased by discharge interference created by obstructions. Consequently, results of the K17 sprinkler research should, in theory, be applicable to larger K factor sprinklers, such as K22-K25 sprinklers. K17 sprinklers were used for Phases 2 and 3.

The use of K14 sprinklers was initially discounted given the recent controversy regarding the adequacy of K14 sprinklers to protect rack arrays of Group A plastic beneath a 40-foot ceiling. However, the extensive legacy use of the K14 sprinkler prompted the exploration of its performance in Phase 4. A total of 20 ADD tests were performed using similar test scenarios to that of the K17 ESFR sprinkler.

Phase 2 examined K17 sprinkler performance related to the obstructions located in the horizontal plane of the sprinkler. The ADD apparatus was used to determine the performance of the sprinkler in the presence of open web steel truss and bridging member obstructions and to select the testing scenarios relevant for the full-scale testing of the sprinkler. Approximately 22 ADD tests and five full-scale tests were performed with K17 sprinklers.

Phase 3 introduced vertical obstruction types, including 3-inch flat, 6-inch flat, 12-inch flat, 3-inch round, 6-inch round and 1 1/2-inch bridging members. A total of 22 ADD tests were performed using K17 sprinklers to determine which full-scale tests would be the most rigorous. Three full-scale tests were performed.

Phase 4, as previously mentioned, focused on the performance of the K14 sprinkler in configurations similar to those explored in Phase 3. A total of 21 ADD tests were

performed to compare the performance of K14 ESFR sprinklers to that of K17 ESFR sprinklers. One full-scale test using K17 sprinklers was performed.

**The Results**

The findings of the project are as follows:

- The obstruction created by an open web steel truss 22 inches to 36 inches in depth, located a minimum of 6 inches horizontally from an ESFR sprinkler, will not significantly decrease sprinkler performance.

- The obstruction created by a bridging member or other obstruction 1 1/2 inches by 1 1/2 inches in size or less, located a minimum of 12 inches directly below an ESFR sprinkler, will not significantly decrease sprinkler performance. This also applies to a bridging member attached to an open web steel truss.

- The obstruction created by a flat or round obstruction less than or equal to 12 inches in width, located a minimum of 6 inches horizontally from an ESFR sprinkler, will not significantly decrease sprinkler performance.

- The obstruction created by a flat or round obstruction less than or equal to 24 inches in width, located a minimum of 12 inches horizontally from an ESFR sprinkler (K14 or K17), will not significantly decrease sprinkler performance.

The findings of the research project were used as the basis for code changes to NFPA 13. These changes were approved through the NFPA code development cycle for publication in the 2022 edition of NFPA 13. Note the code changes are slightly more conservative than the findings of the research.

In addition, an ESFR Obstruction Tool was developed and is located within the project's final report, available at https://bit.ly/3ykn4xE.

*Garner A. Palenske, P.E., is a licensed fire protection engineer in six states. He earned a master's degree in fire protection engineering from California State Polytechnic University, San Luis Obispo. Palenske is employed by Wiss, Janney, Elstner Associates Inc., located in San Diego.*

This article originally appeared in Plumbing Engineer, a TMB Publishing publication. For more articles like this, please visit www.phcppros.com.

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**Nikita Patel, EIT, MBA**
**AYP Liaison**

# AYP Report

We had an exciting start to our AYP Education Series last month and are hoping for a similar outcome for February. This month, we are excited to invite Mark Allen for a presentation on NFPA 99 2021 Code Updates, including the changes we saw pertaining to Instrument Air. This will be a two-part series with a presentation in March by yours truly to fully review the design of compressed air systems now allowed for use for NFPA 99 grade Instrument Air.

This seminar will be free to attend for ASPE Members only and $25 for nonmembers. A CEU certificate will be provided through ASPE after the presentation is completed.

Please note, this seminar will be for our <35yrs crowd. Please click here to register.

Thanks,

Niki

ASPE YOUNG PROFESSIONALS®

16 FEB | 12 PM

Guest Speaker:
Mark Allen

Hosted By:
ASPE Education
Zoom Meeting

# NFPA 99 2021 Changes & Instrument Air Updates

## Attendance is *FREE* for ASPE Members, and $25 for nonmembers

*CLICK HERE TO REGISTER*

Mark is a member of the NFPA 99 Technical Committee on Piping Systems and is well known as the author of the "Medical Gas Design Guide". He served as the VP of Education and Standards in the Medical Gas Solutions Division of Atlas Copco. He is responsible for many of the tools used today for medical gas design, including the BMed PipeSizer mobile app and online platform.

With his extensive background in Medical Gas, he will guide viewers through the NFPA 99 2021 Code Changes. Some extra attention will be focused on one of the most anticipated changes, the updated line pressure requirements for NFPA grade Instrument Air, and its uses within a hospital.

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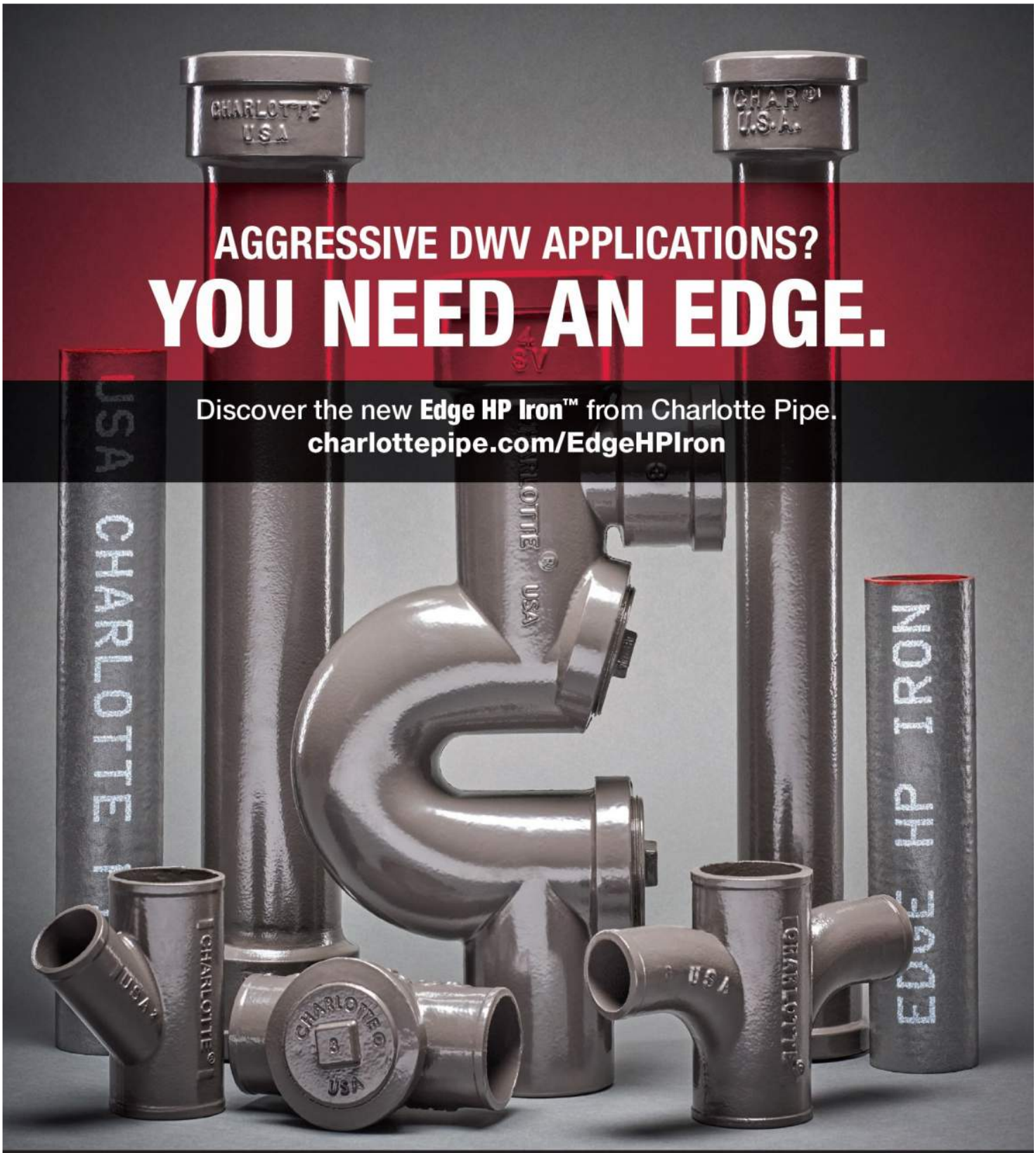


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## Education

This year's Engineers Week Event has been postponed due to Covid. Stay tuned for ay updates.

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It's that time of year again! The Washington DC and Baltimore ASPE Chapters are offering to its membership a virtual CPD Review Session presented by our own David Bailey, CPD, GPD, FASPE. It is scheduled for three consecutive Saturdays – February 12th, February 19th, and February 26th (if necessary). Please see the attached and information below.

As a special offer to our Baltimore Chapter members in good standing, we're offering two free meeting tickets with the purchase of the CPD Review guide, complements of the Baltimore ASPE Chapter. Just let Kathy know when registering.
Each of the sessions will commence at 9:30 AM thru 3:30 PM (EST) with a 45-minute lunch break during the noon hour. If you are interested in participating in the proposed virtual CPD Review Class next month, then please forward an e-mail no sooner than the afternoon of Saturday, February 5th to either Kathy Dwyer or Ned Dwyer at the following respective addresses below to receive a link for the class.

Baltimore: kdwyer@ejdwyer.com
Washington: ndwyer@ejdwyer.com
and please CC at David.Bailey@wsscwater.com

Please have on hand the latest edition of the CPD Study Guide (2020), a calculator, pencil and paper.
Link to order CPD Study Guide through the ASPE Bookstore is as follows:
https://www.aspe.org/product/cpd-study-guide-2020/

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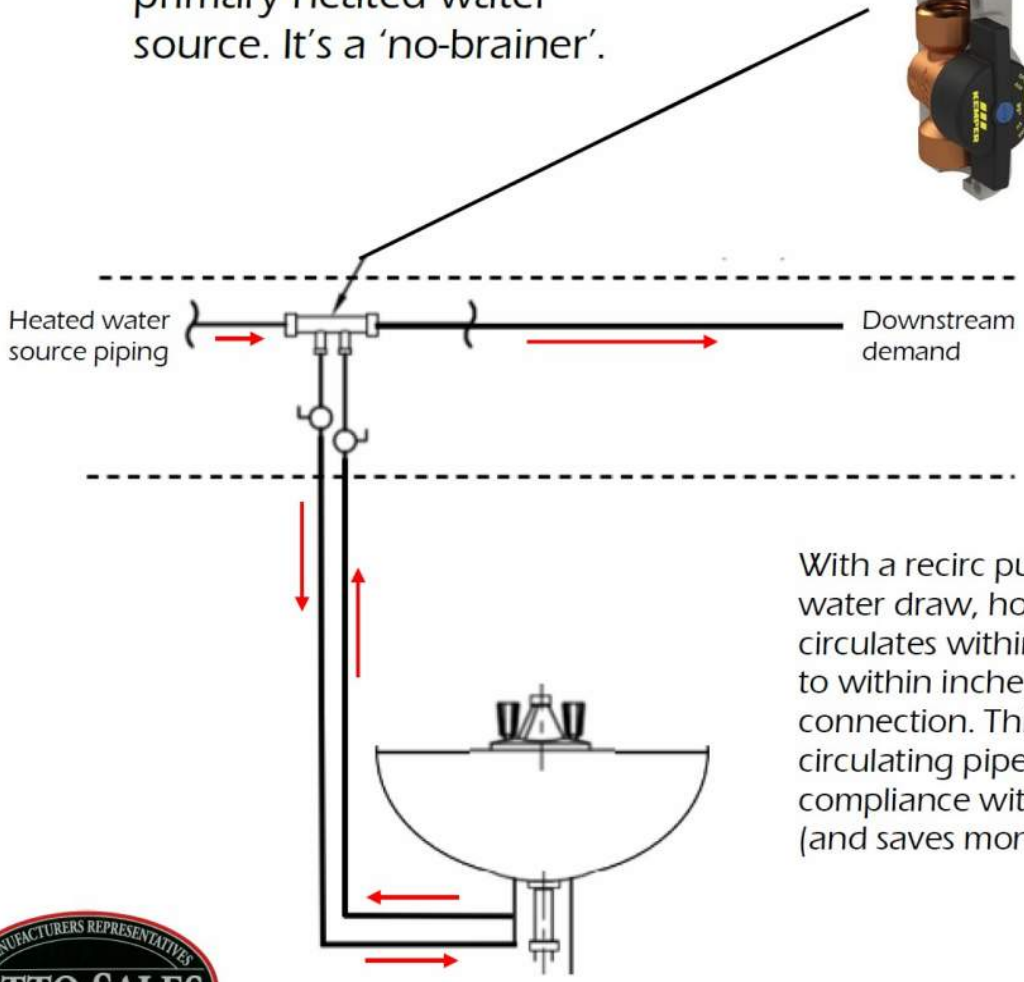


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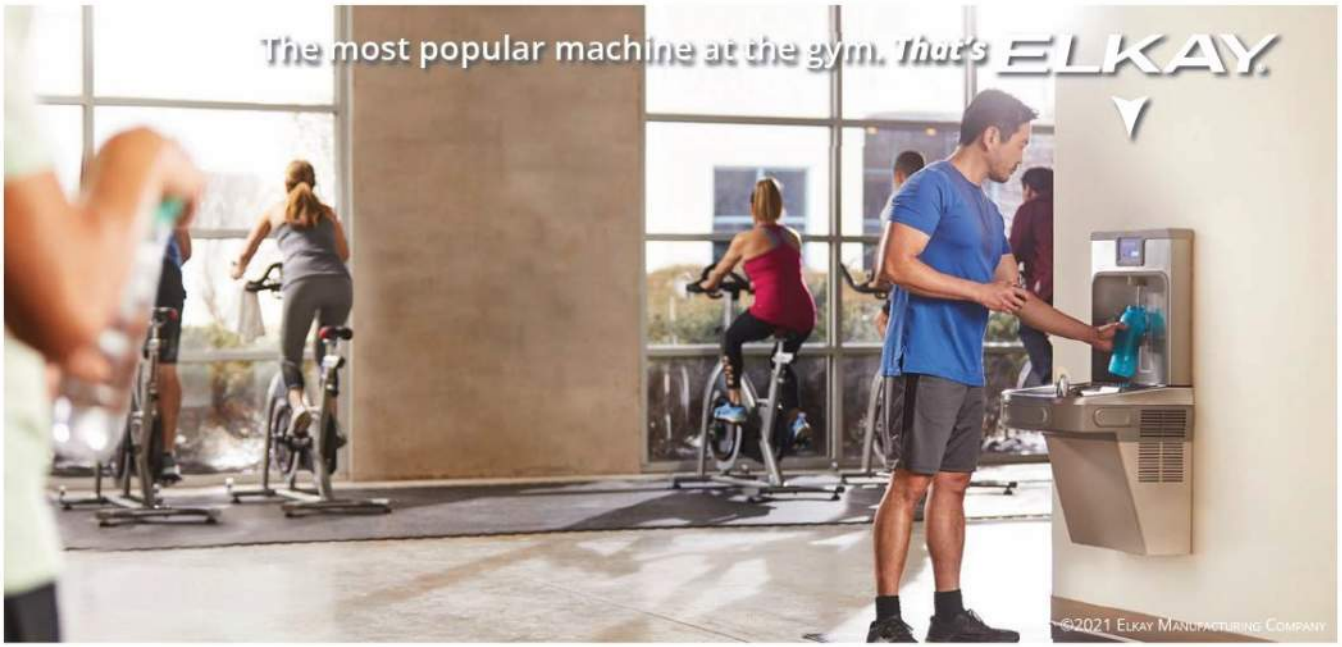


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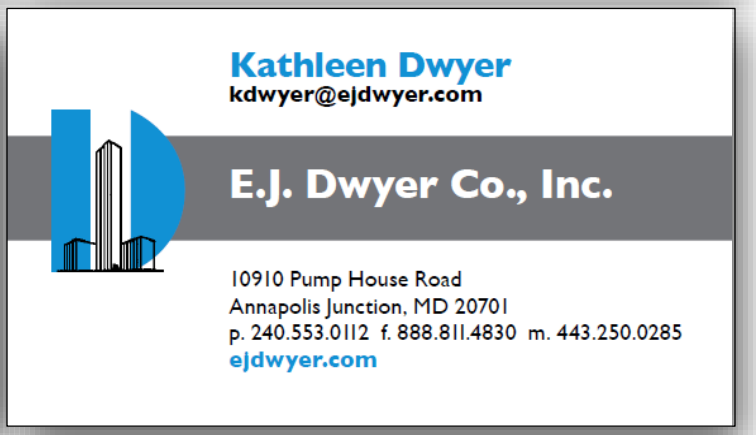



# 2021-2022 ASPE Baltimore Chapter Meeting Schedule

Date: **September 22nd, 2021**
Speaker: Bay Associates
Topic: Heat Pump Water Heater Technology

Date: **October 27th, 2021**
Speaker: Highland Tank
Topic: Oil/Water Separators

Date: **November 17th, 2021**
Speaker: Ames
Topic: Direct Inline Pumping Systems for Sanitary and Storm

Date: **December 15th, 2021**
Speaker: Joyce Agency
Topic: Pressure Reducing Valves

Date: **January 26th 2022**
Speaker: STH
Topic: Fire Pumps

Date: **February 20-26th, 2022**
Engineer's Week—Postponed TBD

Date: **February 23rd, 2022**
Speaker: Prof. Ken Isman
Topic: ESFR and Cloud Ceilings

Date: **March 23rd, 2022**
Speaker: Otto Sales
Topic: Wastewater Systems

Date: **April TBD, 2022**
Event: Annual Golf Outing

Date: **April 27th, 2022**
Speaker: Charlotte Pipe
Topic: Hands-on Starter Fittings

Date: **May 25th, 2022**
Speaker: EJ Dwyer
Topic: Emergency Fixtures

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## Monthly Sponsorship Opportunities

The Baltimore Chapter of ASPE continues to have successful meetings and is looking to continue improving throughout the year.

The Chapter has the following sponsorship opportunities for each month:

**Tabletop Presentations:** $100 to provide a tabletop presentation of equipment or material relative to the plumbing profession. The tabletops will be set up from the beginning to the end of the monthly meeting and provides the opportunity to provide a brief (under 5 minutes) presentation.

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