Conflagrations in Very Large Apartment Complexes

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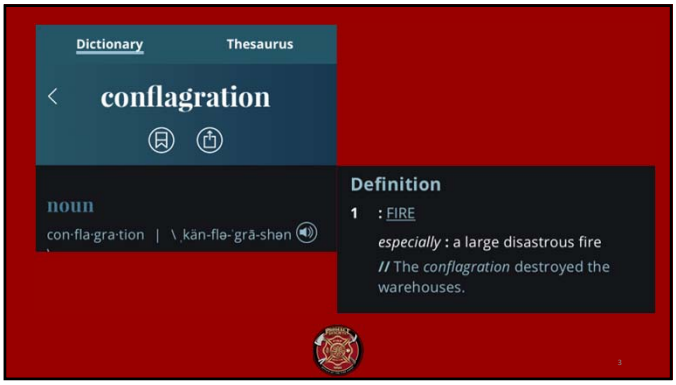

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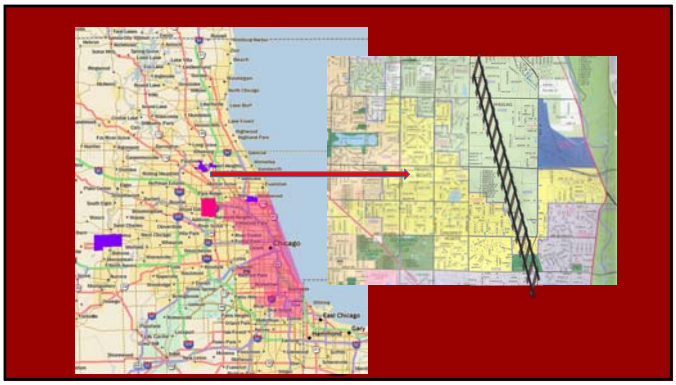

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Objectives

- How common are such fires?
- How lack of experience blinds FD to fire's potential?
- How construction affects fire behavior and spread?
- When and how to order extra alarms using a system like MABAS
- Challenges with:
  - Command post needs
  - Accountability
  - Rehab / moving staff from staging to hot zone over long distances
  - Refueling
  - Water supplies
  - Operations lasting multiple operational periods
  - Involvement with media, victims, HOA, property management, and spontaneous volunteers

6

Tim Olk Larry Shapiro

Thank You!

Steve Redick Jay Kleeman

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Conflagrations in Very Large Apartment Complexes

How common are these fires?

How does lack of experience blind FFs to their potential?

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Once-In-A-Career Fires

TWICE!

10

Previous Xmas eve fire
4th Alarm

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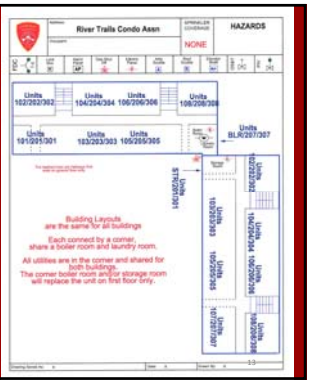
Preplan

Since 1999…
44 times a year



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Conflagrations in Very Large Apartment Complexes

River Trails Condo Fire

July 18, 2018
848 McIntosh Ct.
Unit 201
Time of Dispatch 13:22

Assignment
- 4 engines
- 2 aerials
- 1 heavy squad
- 2 ambulances
- 5 chiefs

14

15

16

17

"C" Side

18

Progression of alarms

Dispatch @ 13:22
Working fire @ 13:28
Box @ 13:32
2nd @ 13:56
3rd @ 14:17
4th @ 14:57
5th @ 1500
Special @ 16:50
Interdivisional Task Force @ 17:38
EMS Box @ 14:16
EMS 2nd @ 15:09

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Conflagrations in Very Large Apartment Complexes

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Fire spread

Construction
Access
Wind
Water supply

21

Mansard Roof

Lightweight wood truss

22

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Conflagrations in Very Large Apartment Complexes

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Conflagrations in Very Large Apartment Complexes

Challenges

E64-DESP
LT. JONES
WALSH
WILSON
CRAIG

32

RIT

DEPARTMENT NAME: Prospect Heights	BOX ALARM TYPE: STRUCTURE FIRE	EFFECTIVE DATE: August 1, 2014	MABAS DIVISION: 3
BOX ALARM #: 9 F 3970	LOCATION OR AREA: All hydranted areas / Grids 3971, 3972, 3973, 3974, 3975 *Area south of Palatine road, north of Old Willow road, east of Wolf road and west along Milwaukee ave. & River road Also southeast corner of Camp McDonald road and Wolf road (3975)*	AUTHORIZED SIGNATURE: *Donald R. Guld, Jr., Fire Chief*	

ALARM	ENGINES	TRUCKS	SQUADS	TENDERS	EMS	CHIEFS	SP. EQUIPMENT	CHG-QUARTERS (STA #)
STILL	Prospect Heights Prospect Heights Wheeling	Prospect Heights			Arlington Hts.	Prospect Heights 905-921-3915		Local callback
Code 4	Mt. Prospect	Northbrook	Lincolnshire Rivereswods RIT / Prospect Heights'		Long Grove	Wheeling Northbrook		General Callback both stations

ALARM	ENGINES	TRUCKS	SQUADS	TENDERS	EMS	CHIEFS	SP. EQUIPMENT	CHG-QUARTERS (STA #)
BOX	Arlington Hts. Deerfield Palatine	Des Plaines	Northfield		Elk Grove Township	Long Grove / North Maine 100 / Arlington Hts.	RIT: Niles Truck North Maine Engine North Maine Bat Chief RIT: bypass staging and report to IC / MSA Cannon	Rolling Meadows Ambulance & Glenview Engine to Station 9

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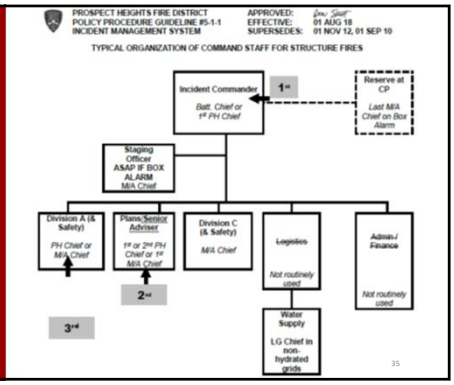
Command Post Operations

- Location
- IC
- Support/Advise
- Staging
- Plans
- Logistics



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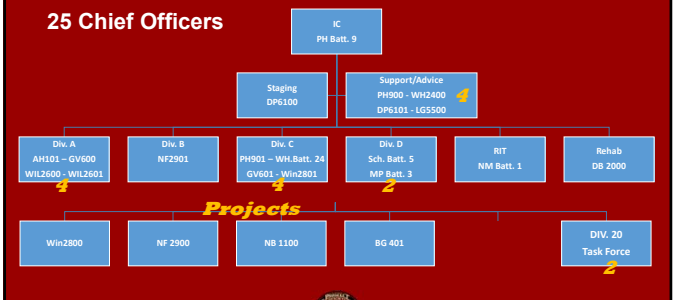
25 Chief Officers



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Drone

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Conflagrations in Very Large Apartment Complexes

Lessons Learned

Do this again:

- Know where the fire is at, where it was and where it is going
- Good positioning
- Know your buildings!
- Alarm upgrades quick

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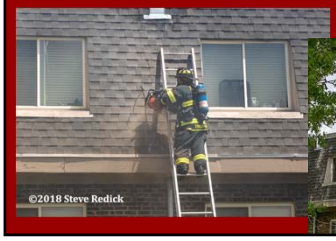
Considered next time:

- Travel route that permits maximum structure view
- Open mansard from balcony or interior



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- Check for extension start far working back
- Communicate opening up v. venting
- Better understanding of the water system
- Second RIT for the "C" side
- 3 chiefs on each side/exposure.
  - 1 on main FG channel working companies
  - 1 on command FG channel with IC
  - 1 as safety

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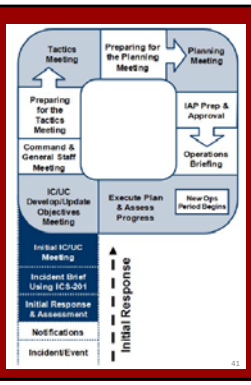
40

- Need scribe
- Accountability
- Rehab & relief



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Conflagrations in Very Large Apartment Complexes

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Conflagrations in Very Large Apartment Complexes

High life hazard

- Time of Day
- Day of Week

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Accessing buildings

51

Sprinkler systems

52

Water supply

- Private hydrants
- Long hose lays
- Hose beds
- Pairing companies

53

Strategy **Stream** **Position**

54

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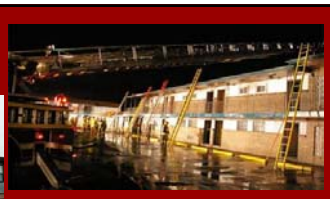
Conflagrations in Very Large Apartment Complexes

Laddering



- Aerials
- Ground/portable ladders

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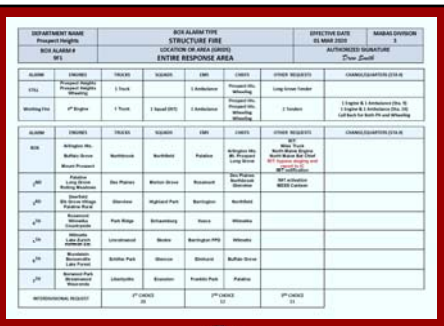

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Refueling

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All the "other" things…

- Media
- Victims
- HOA
- Property management

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Conflagrations in Very Large Apartment Complexes

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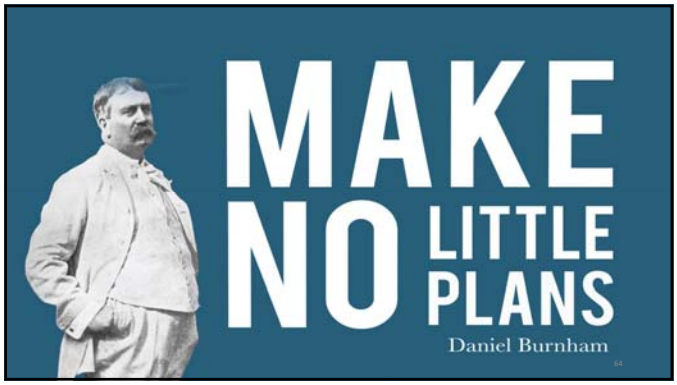

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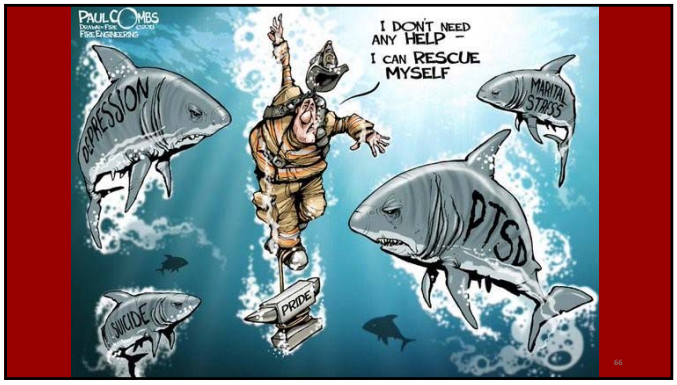

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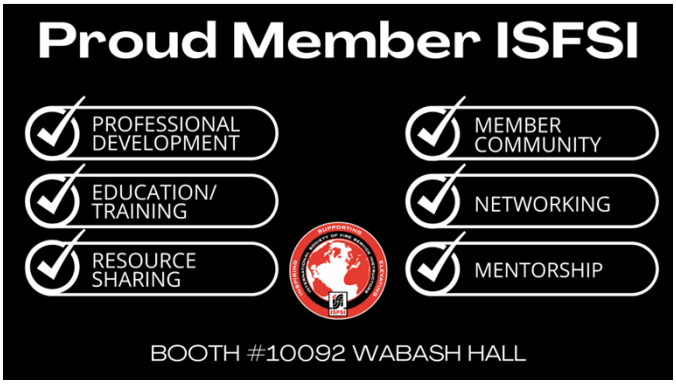

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Conflagrations in Very Large Apartment Complexes

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Conflagrations in Very Large Apartment Complexes

BY DREW SMITH

FIRES IN VERY LARGE APARTMENT complexes represent extraordinary challenges for many fire departments. The typical suburban fire department first-alarm resources and house fire tactics place the fight in a losing position from the start. Early recognition of fire potential and aggressive strategy supported by a well-structured incident command system (ICS) are key to a successful outcome. These fires are low-frequency/high-risk events that many firefighters may not experience in a career. When they do, the implications are profound. For suburban and rural fire departments, incidents involving large complex fires require a significant mutual-aid response.

Practically speaking, a conflagration occurs when the fire department and its readily available mutual aid are an insufficient force against the fire conditions presented. The size, experience, training, and sophistication of fire departments and their mutual-aid partners vary widely. In many cases, these factors are not changeable by the local fire department.

How common are these fires? An Internet search will reveal that they're not all that uncommon, though it may appear otherwise. It appears they're just well dispersed across North America. It is not common for this type of fire to occur in the same geographical region more than once every few years and even less often in a single community. Anecdotally, these fires are infrequent for most suburban or rural fire departments, so such areas have less experience.

Because individual firefighters, their fire departments, and their mutual-aid region lack this experience, they may tend to underestimate the gravity of the situation early on. These fires spread fast, fueled by the attic space's construction materials more than the structure's contents. These fires are also usually well ventilated. The fact that the combustion occurs in a confined area allows for both horizontal and vertical fire travel. Once fire or firefighter activities breach the upper portion of the structure, fire spread usually accelerates. The space for combustion in these attics is enormous.

(1) Will the footprint of the complex permit apparatus to position close enough to be effective? *(Photo by J. Kleeman.)*

The age of the construction may not have provided for proper fire stopping or draft walls that limit or slow down fire spread. It is unlikely that the attic spaces in these structures are equipped with fire sprinklers. If they were, we wouldn't be having this discussion.

Fire spread in these structures is generally a combination of construction factors. Besides combustible construction, the placement of soffit vents near windows and doors is one factor. These vents are usually mounted horizontally as opposed to vertically. As fire exits a compartment through the window or door, the heat naturally rises into the soffit area; if there is a vent there, it instantly permits fire travel.

The roof scheme is also a factor. In vintage buildings, the roof construction is wood and likely consists of lightweight assemblies. The roof framing is typically covered in plywood or a similar wood product. Although it may be fire-resistant, it will eventually burn. Additionally, the roof deck is typically covered with asphalt shingles or other combustible product. Keeping in mind that heat rises, the more vertical the roofing material, the quicker the fire will spread.

Mansard Roof

The most common roof feature in these apartment complexes is a common attic space and, more specifically, the mansard roof, which has two construction schemes. One is a fascia, just a vertical roof built over the structure's existing exterior wall. The other is a mansard roof that extends up one side, across and over, then down the other side with one giant attic space from eave to ridge.

When the mansard only occupies the vertical surface of an exterior wall, fire spread may be less but may still be significant horizontally. When the mansard roof occupies both the vertical exterior walls and the roof, wrapping around the corners, there are many avenues for fire spread. It is not common for the interior of these roofs to be partitioned or sectioned, although newer construction may require such. However, we often find that certain construction trades have breached this partitioning to run wiring, piping, and other mechanical features.

A key to early success and winning the battle is well-structured, well-preplanned, and well-executed early mutual aid. The fire department must assess the tasks necessary for not only Plan A but also Plans B and C. In preplanning and conducting tactical tabletop exercises, ask the following questions, at minimum:

- Where will these fires likely travel to?
- What is the past history of fires in these types of structures?
- What are the experiences of other fire departments with fires in these structures?
- Will one engine crew with three firefighters be able to maneuver the necessary handlines, or will you need to pair multiple engine companies to advance the necessary hoselines?
- What "what if" scenarios can you think of?
- What is the reaction time for other dispatch centers you must call, and how quickly will those fire departments push out?
- How far away are those fire companies, and how long does it take for them to drive to you?
- How soon are you going to make the call for more help? Are you going to wait and see or you going to be proactive? Those who wait and see have worse results than those who front-load these events proactively. No amount of wishful thinking will compensate for the time it takes for resources to deploy.

Your fire department likely needs mutual aid at some point, not just for these types of fires. How well developed is your system? Do you have a system with procedures, and are they exercised? If you need to build a better mutual-aid system,

(2) Will your fire flow overwhelm the fire? How many gallons per minute are needed? *(Photo by Tim Olk.)* **(3)** Where and why will you place your streams? What specific tactic will achieve extinguishment? *(Photo by Tim Olk.)*

consider learning about the Mutual Aid Box Alarm System (MABAS). See "The Mutual Aid Box Alarm System" (*Fire Engineering*, October 2007).

Dispatch

How involved is your dispatch center? Even the best plans are of little value if they cannot be executed. Your requests for mutual aid must be based on resource needs. Call for what you need in a structured, logical manner. Requests for one engine, then another, and another, and so on tax the system. Calling for a greater alarm such as a second, third, or fourth alarm that then dispatches a predetermined selection of resources (such as so many engines, trucks, squads, crews, and so on) provides the incident commander (IC) and command staff with a robust collection from which to create fireground assignments.

Incident Command

A well-staffed incident command post is going to require an IC and several others. Someone must be making the tactical decisions for the immediate problems and doing that on a tactical radio frequency. Someone else must be monitoring and communicating with dispatch and making external requests for resources. Who will be the liaison with any separate emergency medical services (EMS), law enforcement, department of natural resources, or pollution control, to name a few? Is there a safety officer necessary at the command post coordinating multiple field tactical safety officers? Is one chief officer in a sector division or group sufficient? Do you need chief officers for special functions like rapid intervention teams (RITs)? All of this demands a well-structured incident management team and chief officers who can serve as sector/division/group (SDG) supervisors or branch directors.

Firefighters and company officers rightfully focus on task level performance such as the movement of the fire streams or ground ladders into the proper positions and related tasks. This is admirable, but command-level officers must coordinate and choreograph it.

Early on, the companies arriving on one side of the building may not see conditions that companies on an opposite side of the building are experiencing. You can't adopt an attitude that someone is right and someone is wrong. We must accept different companies are facing different conditions and adapt to the worst-case scenario.

Similarly, there may be nothing seen on the exterior and very bad conditions experienced on the interior. Of course, experience is one factor that you can't compensate for. When we know who is reporting, we may be likely to underestimate the value or severity of their conditions, actions, and needs based on their experience or lack thereof. This is dangerous thinking. An inexperienced person experiencing significant fire, or at least what he thinks is a significant fire, must be reinforced, not disregarded just because there is not fire visible undetected. It is entirely possible and likely that you will have significant horizontal fire surprise spread within an enclosed area.

(4) Multiple elevated streams will require a significant water supply. How will you provide the necessary water? (*Photo by J. Kleeman.*)

Wind

How do you assess the effect that wind will have on these operations? How much wind does it take? Previous studies of wind-driven fires tell us that winds as low as 10 miles per hour can produce a substantial volume of fire.

These fires will generally occur in apartment complexes that are spread over a large area. There may be access problems where companies cannot all approach from the same direction. Coordination of staging and deployment is crucial. Effective and safe supervision of companies and activities will not occur with a handful of chief officers. Start thinking of all the jobs necessary.

Start with the command post. What will your incident management team look like? It is likely these incidents are going to go on for more than a few or several hours. Additional operational periods may be needed. This demands command staff planning. How will you rotate personnel so they can swap out with their own company when the incident lasts over many hours? Is a robust rehab needed, one that includes feeding, sanitation, and more than simple medical surveillance?

Accountability

Accountability may present a challenge. Not all companies may be able to process through the command post. Companies may arrive from different directions and be given assignments without ever staging. SDG supervisors (chiefs) will need to manage accountability. With the likelihood of these chiefs' span of control being stretched and the activity escalating furiously, these chiefs may need an aide or two assigned to their SDG. Pairing a safety officer with a chief in each SDG may improve tactical performance.

When a staging area is hundreds of yards away or the apartment complex geography limits later-arriving companies from driving onto the property, the movement of personnel may create a variety of challenges. First, if you expect a company to walk the equivalent of two or more football fields in full gear carrying SCBA and tools, perhaps over snow or ice or in temperatures exceeding a heat index of 90°F, of how much value will they be when they arrive at their assignment? Second, when help is needed fast (because of a Mayday or escalating fire conditions), just how fast will staged companies be able to reach their assignment? Dedicating resources, perhaps nonfire suppression resources such as a transit bus or emergency management personnel with a van, pickup truck, or multipassenger utility terrain vehicle (UTV), to facilitate this movement may be desirable. Many ICs have done this, and it works well. If you're thinking, "Yes, let's do that," make a plan now and exercise it to achieve the best results later.

Water Supply

The firefighting water supply in an apartment complex is likely insufficient for these size fires. How will you move larger volumes of water into the area? If you have four or more elevated streams, then the total fire flow is likely to exceed a few thousand gallons per minute (gpm). Relay pumping is one option. A tanker/tender shuttle is another. Drafting presents a third option. For many suburban and rural fire departments, these fires will require you to rely on mutual-aid companies to operate the water supply operations. Don't assume this can just happen. Are the companies you intend to rely on well-versed in these

(5) What is your plan to refuel during extended operations? (*Photo by J. Kleeman.*)

operations, or should you preplan particular companies for certain water supply functions? If your region is primarily a hydrant operation, identify some more distant companies who primarily rely on a shuttle or drafting operation.

Professional football games last about three hours; pro hockey games, 2½ hours. In both cases, the players have an intermission, and not all the players play at the same time. This is not so in firefighting.

In a major campaign fire, operations can last well past three hours and as much as eight to 12 hours. When extended operations are necessary, identify that need as soon as possible and start planning for the second operational period. Schedule typical operational periods other than the first period for eight or 12 hours, even if they are likely to last less. The purpose is to identify the strategic and tactical objectives for the next period and then develop the necessary resources to achieve them.

Often you will need to rotate in fresh personnel from the same departments or different departments and rotate out those who worked before them. If the rotation involves one fire department replacing its own personnel, then the apparatus can usually remain. If the rotation involves a different fire department making the replacement, then what are the apparatus arrangements, particularly if the original apparatus is pumping or applying a fire stream? On these extended operations, how will you refuel apparatus, both gasoline and diesel? What provisions do you have for doing this, and who will pay for it? Is a commercial provider readily accessible? Is there a mutual-aid organization that can do this? Is there another governmental agency at the local county or state level that can do this?

Resident Displacement

When a large number of families are affected and displaced, the fire department must deal with another management function. What is your relationship with the American Red Cross, the Salvation Army, or a similar organization that could assist with reunification, short- and long-term accommodations, and spontaneous volunteers? Who will manage donations to the affected families? If these are marginalized communities, is there a faith-based organization or other community service organization that can help them long-term?

Donations to the affected persons may come in the form of both money and material possessions. Fundraising platforms for managing this exist, but who will have access and be held accountable for distributions? What about material possessions like donations of clothes, food, and other items? I am certainly not suggesting the fire department take on all of this, but someone is going to look to the fire department for direction. Now is the time to identify other municipal organizations, nongovernmental organizations, or faith-based organizations and make a list of contacts for future reference.

6

(6) Rehab will be a challenge when at a large scene with dozens of members operating. What is your plan to effectively achieve rehab? (*Photo by Tim Olk.*)

Public Information

Be prepared to deal with the media, both print and electronic. If the fire department does not provide information and some access to the scene for the media, then they will try to figure it out on their own. The fire department will not control the information obtained from so-called experts, bystanders, and anyone the media listens to; this may hurt, not help you.

Property Management Organization

These complexes are managed by a professional organization and governed by a homeowners' association (HOA). You will need to deal with both. The property management controls access to the infrastructure. The HOA board will be necessary for large financial commitments or policy enforcement. If the fire department's own fire inspectors do not have excellent relations with the management and HOA, who does? Is it the municipality or county of jurisdiction's building or code enforcement personnel? If so, do you have excellent relations with them, and can you bring them into your command structure to achieve the necessary action? Although you can establish these relationships during a time of crisis, they are best developed before.

After-Action Review

When the incident concludes, you need to conduct an after-action review (AAR). Begin the data and record collection while the incident is ongoing. Assign someone to scribe, collect, and organize notes, logs, dispatch, and public safety answering point communication recordings. Select someone who excels at this. Identify persons for this role ahead of an incident. Perhaps a nonsuppression administrative staff member?

Following the incident, gather the players for a structured review of the incident start to finish. If it becomes a frustration or blaming event, consider a cooling-off period and use an outside facilitator. Remember, the purpose is to improve, not to discipline. There are avenues for individual corrective actions independent of the AAR.

An additional source of perspective is from fire buffs and other observers. These are the people who come to your fire to observe, usually as close as they can get, and many times take numerous photos and perhaps video. These people have proven invaluable to me over my career. In many cases, we learned much about our operations from their photos and videos. Most are usually honored to share their work.

...

For many fire departments, these are once-in-a-career fires. Lessons are learned in the School of Hard Knocks. Most of the time, we are lucky that no one is seriously injured or killed—firefighters or civilians. However, we cannot count on luck. We must prepare. Prepare for the fire that taxes your system, whether that is two firehouses and 25 personnel or 24 firehouses and 100 personnel. The challenge comes from recognizing when it's not "business as usual" and implementing an aggressive command strategy that gets sufficient resources ahead of the problem in a timely manner. ■

REFERENCE

Smith, Drew. "The Mutual Aid Box Alarm System." *Fire Engineering*, October 2007. https://bit.ly/3rY0GZS.

DREW SMITH, BS, EFO/CFO, LP, is chief of the Prospect Heights (IL) Fire Protection District. A 40-plus-year member of the fire service, the past 31 as a chief officer, he has served in volunteer, combination, and career departments. Smith is an experienced training officer and regional technical rescue team director and has presented at FDIC International and other fire service conferences.

Drew Smith will present "Conflagrations in Very Large Apartment Complexes" at FDIC International in Indianapolis, Indiana, on Wednesday, April 27, 2022, 10:30 a.m.–12:15 p.m.