

*2022 ESO FIRE SERVICE INDEX:*

# INSIGHTS AND BEST PRACTICES FOR FIRE DEPARTMENTS

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# CONTEXT AND OVERVIEW FOR THE INDEX

A logical way to measure the performance of a fire department is to gauge how quickly they respond to emergencies—turnout time, travel time, response time, etc. While these are important metrics, measuring time alone does not paint the full picture of a fire department’s performance.

We have designed this report as a data tool and benchmarking guide to help you better understand opportunities, challenges, and victories in a variety of performance-related metrics in your own organization. High-quality data and proper analysis enable smarter planning and decision-making to improve community health and safety, which is at the heart of ESO’s mission.

Ultimately, we are looking to help fire leaders ignite quality improvement conversations by exploring questions such as the following:

-  What are our most common response types overall? Among fire calls?
-  How many of our responses are EMS compared to fire?
-  For fire calls, what are the most common property types we respond to?
-  How much property loss was reported overall?
-  How quickly do we respond to a call on average?
-  How frequently are firefighters documenting decontamination procedures?

The appropriate metrics for evaluating the success of your fire department will vary depending upon a number of factors, including the size of the population served and geographic location. In some cases, the emphasis is less about identifying “success” and more about understanding your community and its unique needs. However, we believe an objective look at aggregate data across the United States can give you a good idea of how you are performing compared to your peers.

As stated earlier, the purpose of this report is to serve as a point of reference for fire departments to identify which areas are in alignment and which areas represent opportunity for improvement – or at least further assessment and evaluation. This quantitative approach to measuring performance gives fire departments a starting framework to continually refine strategies, increase efficiency, improve outcomes, and allocate resources appropriately.

The 2022 ESO Fire Service Index report uses data compiled from 642 participating agencies and represents 3,248,820 incidents from January 1, 2021 - December 31, 2021. We hope you find this Fire Service Index report helpful, enlightening, and empowering.

## GLOSSARY

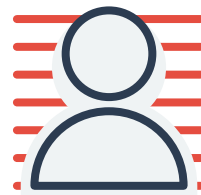
**Incident:** A situation involving smoke, heat, and flames in a structure, vehicle, or grass.

**Mutual aid:** Lending assistance across jurisdictional boundaries.

**Automatic aid:** Assistance that is provided through a contractual agreement between agencies.

## LIMITATIONS

This Index is retrospective and looks at aggregate data from January 1, 2021 - December 31, 2021. There are no universal rules designed around these trends. The purpose of the Index is to be informative and directional, but it is not intended to be a scientific study – nor is it intended to be comprehensive in nature. We hope this Index serves as a body of literature that adds to the discussion and conversation around best practices for each of the selected metrics to help improve community health and safety.



**642**  
**AGENCIES**  
**3,248,820**  
**INCIDENTS**

**175,162**  
**AID GIVEN**  
**INCIDENTS WITH MUTUAL**  
**OR AUTOMATIC AID GIVEN**

We excluded responses with Mutual or Automatic Aid Given from all subsequent analyses.

# KEY METRICS



**MOST COMMON INCIDENT TYPES**



**PERCENT OF EMS CALLS VS. FIRE CALLS**



**MOST COMMON PROPERTY TYPES FOR  
FIRE RESPONSES**



**DOCUMENTATION OF TOTAL PROPERTY  
AND CONTENTS LOSS AND VALUE**



**FIRST APPARATUS TIMES**



**DECONTAMINATION**

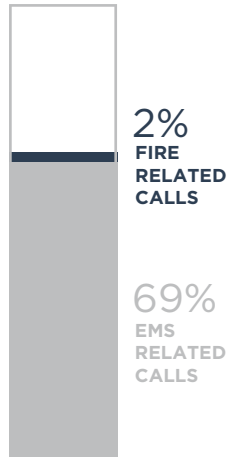
# KEY FINDINGS

The 2022 ESO Fire Service Index report looked at 3,248,820 incidents from January 1, 2021 - December 31, 2021. At a macro level, the data revealed the following findings:

Fire departments continue to respond to more EMS calls than fire calls. Based on our data, we see that 300-series EMS incidents accounted for

69%

of all incidents, while 100-series Fire responses accounted for 2% of all calls.



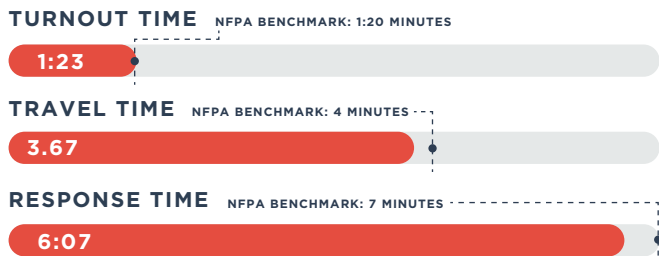
Residential properties accounted for 80% of all fire calls (100 series), a significant increase from 42% in 2020.

80% 2021      42% 2020



The most common types of fire responses include structure fire (Series 110), outside rubbish fire (Series 150), and natural vegetation fire (Series 140).

Median first apparatus turnout time, travel time, and response times are in alignment with NFPA benchmarks.



# FIRE SERVICE INDEX



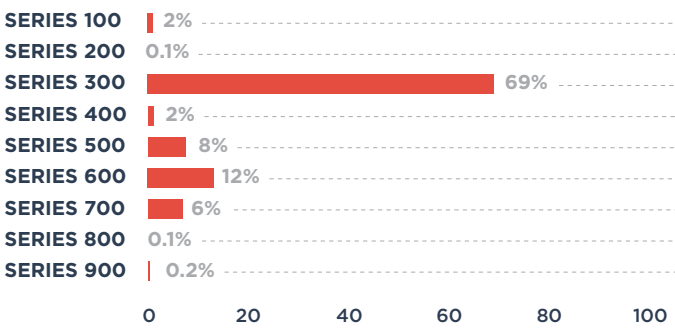
## INCIDENT TYPES

Tracking the breakdown of incidents by type from year to year allows us to identify trends so fire departments can see how their most common incident types compare nationally.

Chart 1 shows the breakdown of all incident types. Overall, the data match what we saw in 2020, with a majority of incidents being EMS calls (Series 300).

Chart 1

**MOST COMMON INCIDENT TYPES**



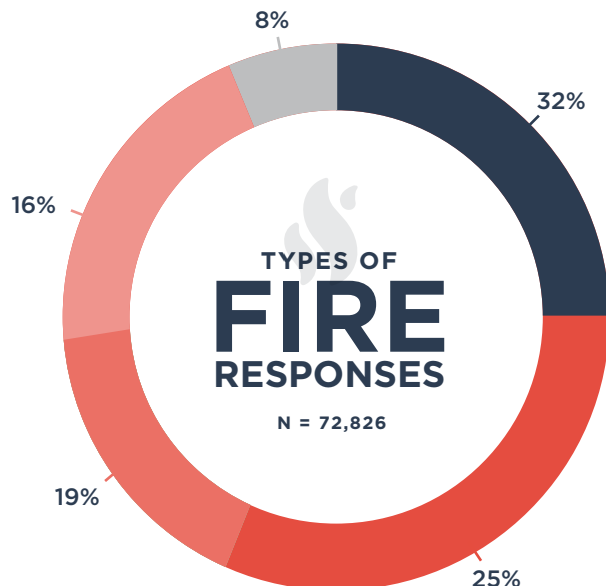
### INCIDENT TYPES

- SERIES 100:** Fire
- SERIES 200:** Overpressure Rupture, Explosion, Overheat (No Fire)
- SERIES 300:** Rescue & Ems Incident
- SERIES 400:** Hazardous Condition (No Fire)
- SERIES 500:** Service Call
- SERIES 600:** Good Intent Call
- SERIES 700:** False Alarm & False Call
- SERIES 800:** Severe Weather & Natural Disaster
- SERIES 900:** Special Incident Type

When limited to fire incidents only (100 series), the data show the three most common fire response types are structure fire (110 – 32%), outside rubbish fire (150 – 25%), and natural vegetation fire (140 – 19%). In 2021, natural vegetation fire overtook vehicle fire as the third most common fire response type. Chart 2 shows the breakdown of categories of fire-specific incident types (100 series).

Chart 2

**TYPE OF FIRE RESPONSES**



- 32% **SERIES 110:** STRUCTURE FIRE
- 25% **SERIES 150:** OUTSIDE RUBBISH FIRE
- 19% **SERIES 140:** NATURAL VEGETATION FIRE
- 16% **SERIES 130:** MOBILE PROPERTY (VEHICLE) FIRE
- 8% **ALL OTHERS**  
SERIES 100: FIRE, OTHER  
SERIES 120: FIRE IN MOBILE PROPERTY USED AS A FIXED STRUCTURE  
SERIES 160: SPECIAL OUTSIDE FIRE  
SERIES 170: CULTIVATED VEGETATION, CROP FIRE

## RECOMMENDED ACTION

An interesting finding in the 2021 data is that natural vegetation fire was the third most common type of fire call, overtaking vehicle fire as the third most common type of fire call in 2020. This may be due, in part, to changing wildland fire patterns, which have resulted in longer wildfire seasons, greater wildfire frequency, and larger wildfire burn areas.<sup>1</sup>

Although wildfires do not impact all communities equally, nearly 45 million homes and 72,000 communities are at risk of being affected by a wildfire.<sup>2</sup> Whether your fire department directly serves areas that are regularly impacted by wildfires, or whether your department provides mutual or automatic aid to a fire department that manages wildfires, it is important to be up-to-date on wildland fire best practices, including wildland training and wildland personal protective equipment (PPE). [The International Association of Fire Chiefs \(IAFC\)](#) and the [U.S. Forest Service](#) offer an extensive toolkit of resources for wildland fire prevention and management.

# FIRE SERVICE INDEX

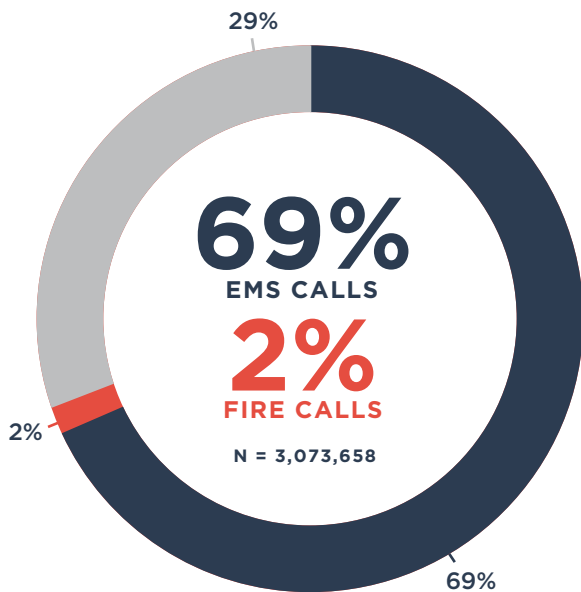


## EMS VS. FIRE CALLS

The number of EMS incidents is a trend that has been monitored for some time. With the advent of new, more fire-resistant building materials – as well as an increase in community risk reduction programs – fire calls have been decreasing overall. As a result, the American fire service has predominantly become involved in EMS on some level, whether it be first response by trained EMS personnel, or first response with ambulance transport.<sup>3</sup> Many departments are looking to hire EMS professionals or cross-train firefighter/EMS professionals to adjust to the changing incident volume.

Chart 3

EMS-BASED INCIDENTS VS. FIRE-BASED INCIDENTS



### TYPE OF INCIDENTS

- 69% 300 SERIES: RESCUE & EMS INCIDENT
- 2% 100 SERIES: FIRE
- 29% ALL OTHER INCIDENTS

### RECOMMENDED ACTION

If your department doesn't currently engage with community partners, use the opportunity to collaborate more closely on community risk reduction. Partners like public health organizations, hospitals, private or third-party EMS, and alternative transport programs can provide much broader engagement to help improve the health and safety of a community.

Since many fire departments also participate in EMS activities, focus on risk reduction programs that could help decrease EMS call volume. Examples of these types of programs include slip, trip, and fall prevention; community health/wellness education; and community partnerships for mental health, medication assistance, and home food delivery for patients who have difficulty leaving their homes. Risk reduction programs focused on opioid overdose prevention may help some communities stay safer as well.

In our data, we see that 69% of all incidents were EMS calls (300 series), which is consistent with what we saw in the 2021 Fire Service Index. About 2% of incidents were fire-based incidents (100 series), which is a small drop in the number of fire incidents that we saw in the 2021 Fire Services Index (3%). Chart 3 shows the breakdown of EMS vs. fire incidents in relation to all incident types.



# FIRE SERVICE INDEX



## PROPERTY TYPES

As people spent more time at home during the COVID-19 pandemic, we unfortunately saw a rise in the number of residential fires.<sup>4</sup> 2021 was no exception, with residential properties (one or two-family units and multifamily units) accounting for 80% of all fire calls (100 series). This is a staggering increase from the findings in the 2020 Fire Service Index, which showed residential properties as accounting for 42% of all fire calls (100 series).

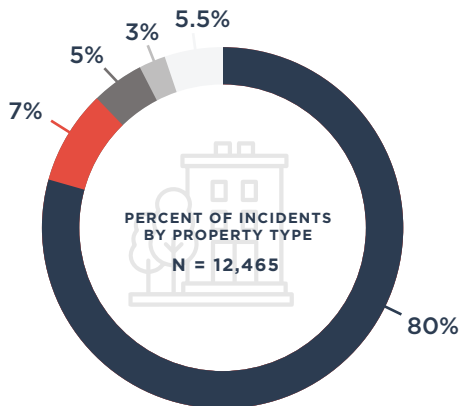
Chart 4 shows the top five most common property types responded to by fire departments for 100-series calls. Chart 5 shows the breakdown of residential property types.

### PROPERTY USE CODES FOR 111 (BUILDING FIRE) INCIDENTS

- 1XX:** Assembly
- 2XX:** Educational
- 3XX:** Healthcare, detention, and correction
- 4XX:** Residential
- 5XX:** Mercantile, business
- 6XX:** Industrial, utility, defense, agriculture, mining
- 7XX:** Manufacturing, processing
- 8XX:** Storage
- 9XX:** Outside or special property

Chart 4

PROPERTY USE AMONG 111 (BUILDING FIRE) INCIDENTS



PERCENT OF INCIDENTS BY TYPE

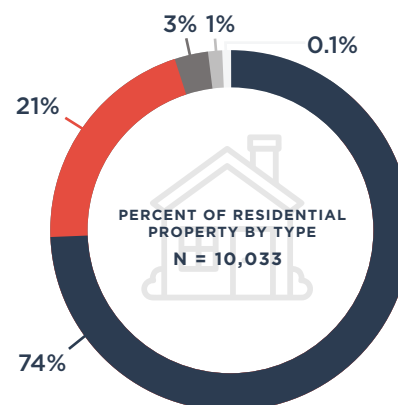
80%	4XX	3%	1XX
7%	8XX	5.5%	ALL OTHER TYPES (2XX, 3XX, 6XX, 7XX, 9XX)
5%	5XX		

### MOST COMMON RESIDENTIAL PROPERTY USE

- 400:** Residential, other
- 419:** 1 or 2 family dwelling
- 429:** Multifamily dwelling
- 439:** Boarding/rooming house, residential hotels
- 449:** Hotel/motel, commercial
- 459:** Residential board and care
- 460:** Dormitory-type residence, other
- 462:** Sorority house, fraternity house
- 464:** Barracks, dormitory

Chart 5

MOST COMMON RESIDENTIAL PROPERTY USE



PERCENT OF RESIDENTIAL PROPERTY BY TYPE

74%	419	1%	449
21%	429	.06%	ALL OTHER TYPES (2XX, 3XX, 6XX, 7XX, 9XX)
3%	400		

## RECOMMENDED ACTION

Post-pandemic life has revealed fundamental changes to the world. For example, an increase in remote and hybrid work means that people are home more often than they were pre-pandemic, which increases residential fire risk. Focus community risk reduction efforts on educating the public about home fire prevention initiatives like smoke detector programs, home evacuation programs, home fire extinguishers, and ensuring residents adequately mark their address so the homes are easy to find at night or in sight-hindering conditions.

Additional prevention efforts should ensure rental property owners understand their responsibilities regarding maintenance and smoke detectors. Make sure apartment and multifamily complexes are updating and testing systems. Consider implementing ordinances like restricting the use of barbecue grills on balconies or requiring stove suppression systems in multi-story buildings. Rules like these can help prevent small fires, which can grow into larger fires.

Additional residential fire safety education could include cooking safety as meals continue to be cooked at home, electrical safety as people continue to work from home, and how to safely extinguish and dispose of cigarette butts and firewood ash. [The National Fire Protection Association \(NFPA\)](#) offers several educational resources that are specific to educating an audience that is spending more time at home. As an additional safety measure, fire departments should evaluate the value of home sprinklers in code adoption and updates to help decrease fire damage and increase survivability.

# FIRE SERVICE INDEX



## PROPERTY & CONTENTS: LOSS & VALUE

With residential fires accounting for such a large proportion of all fire calls in 2021, we took a closer look at property and contents loss and value for building fires (111s) with residential property use codes (4XX).

The total estimated property loss reported among residential building fire calls during 2021 was more than 713 million dollars, with another estimated 1.3 billion dollars in estimated contents loss. Chart 6 displays the total estimated property and contents loss and value among building fire responses (111s) with residential property use codes (4XX).

Our analysis shows a significant difference between the total estimated property loss and the total estimated property value, indicating that property loss may not be consistently recorded. When it comes to contents, we see a higher estimated contents loss than contents value. This difference could be due in part to the difference between the insurance company's and the homeowner's valuation of the contents.

Chart 7 shows the rate of documentation of property and contents loss. We see opportunity for improvement in documentation, with 18% of property loss documentation and 27% of contents loss documentation indicating "null" or "zero." Complete and accurate documentation is essential to assessing the full impact of a fire.

Chart 6

PROPERTY & CONTENTS LOSS & VALUE

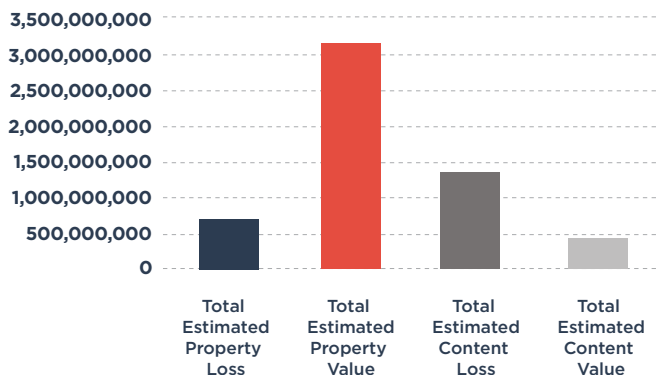
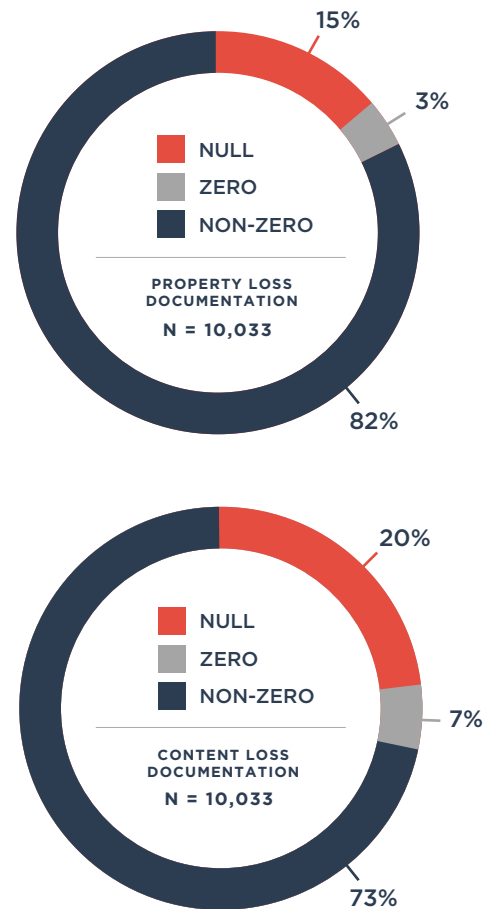


Chart 7

PROPERTY & CONTENTS LOSS DOCUMENTATION: BUILDING FIRES WITH RESIDENTIAL USE PROPERTY CODES



## RECOMMENDED ACTION

Documenting the estimated value of property and contents lost in a fire offers many benefits to fire departments, including serving as an indicator of the severity of the incident and serving as a benchmark for progress in fire protection.<sup>5</sup> Additionally, showing loss compared to total value of a property creates an opportunity to highlight the impact of the fire department's efforts in the community.

Taking advantage of collecting and documenting values shows the real value of the fire department through what you are protecting in the community.

Property values can be calculated using NFPA recommended calculation steps, or via local tax assessor web sites. [The U.S. Fire Administration \(USFA\)](#) recommends using the International Code Council (ICC) Building Valuation Data (BVD) formula to help fire departments determine dollar loss on fires. The BVD provides the “average” construction cost per square foot.

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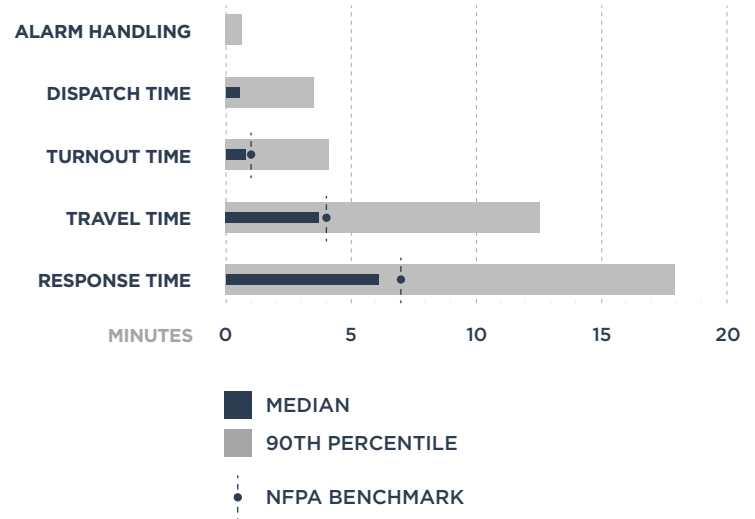


## FIRST APPARATUS TIMES

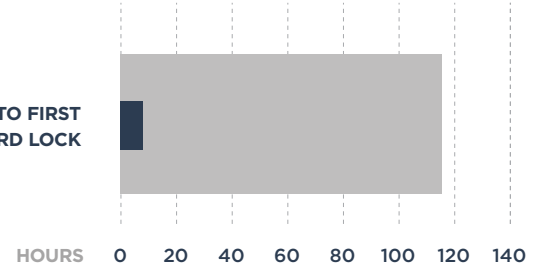
In fire and EMS, the time it takes to respond to calls can be crucial to the resolution of an incident. Time can add context to a fire department's overall performance, but it should not be the only measure considered when analyzing performance. Considering other metrics like lights and siren use (as in EMS) can also contribute to performance and how safely a fire department is operating in the community.

In Chart 8, we identify the median and 90th percentile times for a range of metrics related to response time for both Fire (100 series) and EMS (300 series) calls. For Fire and EMS responses, the NFPA has set guidelines of a 4-minute or less travel time, 80 seconds for fire turnout time, and 60 seconds for EMS turnout time. For response time, the median travel time for both fire and EMS fell at or below the guideline. Median turnout time for both fire and EMS is slightly higher than the recommended times.

### EMS (300 SERIES)

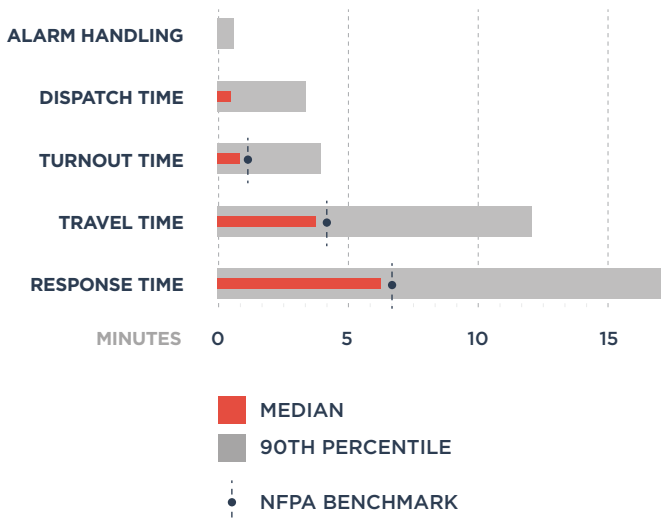


### TIME TO FIRST RECORD LOCK

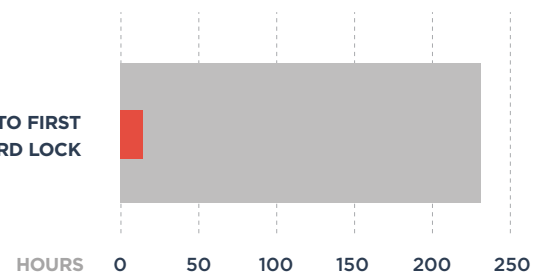


**Chart 8** FIRST APPARATUS ON SCENE TIME BREAKDOWNS

### FIRE (100 SERIES)



### TIME TO FIRST RECORD LOCK



## RECOMMENDED ACTION

Your crews take swift action with each call. However, in the rush of acting as quickly as possible, they may not always know or track exactly how long they are taking for turnout. Adding timers with a notification system showing turnout time as crews are headed to the truck can enable easy time tracking. Sharing these turnout times with each crew monthly will provide important, actionable feedback related to their performance.

When tracking travel time and setting goals for your department, take your unique local community and deployment plan into account. The NFPA 1710 standard was designed primarily for communities with career or paid firefighters, whereas the NFPA 1720 standard was designed for communities with volunteer firefighters. Use these standards, your own data, and collaborate with community leaders to establish appropriate baselines and benchmarks. Then report on your performance to both internal and external stakeholders.

## GLOSSARY

**Alarm handling:** Public safety answering point (PSAP) time to alarm time.

**Dispatch time:** Alarm time to dispatch time.

**Turnout time:** Dispatch time to enroute time.

**Travel time:** Enroute time to on-scene time.

**Response time:** Alarm time to on-scene time.

**Time to first record lock:** Last unit clear to first lock.



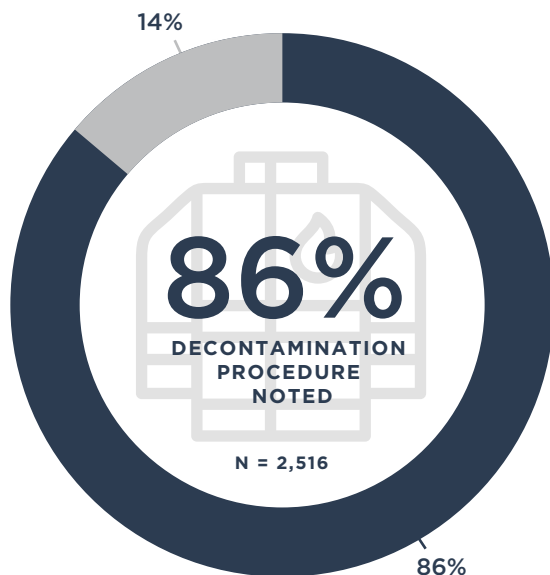
## DECONTAMINATION

Firefighters face many health and safety risks in their work, and one of the most notable long-term risks is cancer. A multi-year study by the National Institute for Occupational Safety and Health (NIOSH) found that firefighters had a 9% increase in cancer diagnoses and a 14% increase in cancer-related deaths over the U.S. population.<sup>6-7</sup>

An essential part of mitigating cancer risk in firefighters is using proper PPE at each incident and throughout the incident. Also having cleaning methods like wet-soap decon and commercial wipes are effective ways to remove contaminants.<sup>8</sup> Documenting decontamination procedures is an important part of firefighter safety because it provides an overview of which crew members have experienced more exposures and which may require additional healthcare monitoring and increased testing/screening for early cancer detection, if present.

Chart 9

**DECONTAMINATION FOR FIREFIGHTER AFTER A WORKING FIRE (111 INCIDENT TYPE)**



■ DECONTAMINATION PROCEDURE  
■ NO DECONTAMINATION PROCEDURE

### RECOMMENDED ACTION

One of the best ways to reduce the risk of cancer in the fire service is to educate and train your crews on decontamination procedures from day one. Provide your crews with frequent training and education, as well as annual physicals and cancer screening.

Tracking and documenting exposures also benefits the health and safety of firefighters, but it is only one part of the equation. Data must be analyzed and interpreted to fully understand the risks that firefighters face and develop best practices to help mitigate risk. On an industry-wide level, sharing health and exposure data with employers and organizations like the [National Firefighter Registry](#) can assist researchers studying the correlation between certain illnesses and exposures.

The data can also help form industry best practices, legislation and guidelines, and even make improvements in manufacturing of firefighting equipment, suppression tools, and construction materials.

Chart 9 shows the rate of documentation of decontamination for firefighters working a building fire (111 incident type) with exposure to smoke or products of combustion. We see that a promising 86% of incidents had at least one decontamination procedure noted. However, given the importance of decontamination in ensuring firefighter safety, there is opportunity for improvement in documenting all decontamination procedures.

# METHODOLOGY

The dataset for the 2022 ESO Fire Service Index report is real-world data, compiled and aggregated from 3,248,820 incidents from fire departments across the United States that use ESO's products and services. Incidents occurred between January 1, 2021 and December 31, 2021.

## OK, NOW WHAT?

Organizations should use this information to understand why metrics are important and which metrics and drivers can have the biggest impact on your department and the communities you serve.

With this Index as a foundation, you can perform your own analysis to serve as the basis for other performance measures and outcomes. The metrics shown in this study are by no means exhaustive. Every department is unique and has its own strengths, structure, and goals. Because of these attributes, results achieved by one organization may not be attainable by another for a variety of reasons. However, these metrics should provide a foundation to compare your measurements and outcomes to what we are seeing nationally.

**TO LEARN MORE ABOUT HOW  
ESO PRODUCTS CAN IMPROVE  
YOUR DEPARTMENTS ACCESS  
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# ESO'S MISSION

ESO mission is to improve community health and safety through the power of data. That is why we produce our suite of Indices—the Fire Service Index, the EMS Index, and the Trauma Index—annually. Our mission drives which metrics we analyze, whether tied to quality and process improvement, community health, or provider safety. We make the Indices publicly available at no cost because we believe it is the right thing to do to not only fulfill our mission, but to help improve the industries that we serve.

# REFERENCES

1. U.S. Environmental Protection Agency. “Climate Change Indicators: Wildfires.”  
<https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires#:~:text=Multiple%20studies%20have%20found%20that,wildfire%20frequency%2C%20and%20burned%20area.&text=The%20wildfire%20season%20has%20lengthened,and%20drier%20soils%20and%20vegetation.>
2. National Fire Protection Association. “Wildfire Preparedness Tips.”  
[https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Wildfire-safety-tips.](https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Wildfire-safety-tips)
3. International Association of Fire Chiefs. “Position: Fire-Based Emergency Medical Services.”  
[https://www.iafc.org/about-iafc/positions/position/iafc-position-fire-based-emergency-medical-services.](https://www.iafc.org/about-iafc/positions/position/iafc-position-fire-based-emergency-medical-services)
4. The American Red Cross. (2021 May 04). “Home Fire Responses Rise 16% in First Three Months of 2021” [Press Release].  
<https://www.redcross.org/about-us/news-and-events/press-release/2021/home-fire-responses-rise-16-percent.html#:~:text=In%20the%20first%20three%20months,spent%20more%20time%20at%20home.>
5. U.S. Fire Administration. “Calculating Fire Loss on NFIRS Forms.”  
[https://www.usfa.fema.gov/nfirs/coding-help/nfirsgrams/nfirsgram-calculating-fireloss.html.](https://www.usfa.fema.gov/nfirs/coding-help/nfirsgrams/nfirsgram-calculating-fireloss.html)
6. Daniels RD, Kubale TL, Yiin JH, et al Mortality and cancer incidence in a pooled cohort of US firefighters from San Francisco, Chicago and Philadelphia (1950–2009) *Occupational and Environmental Medicine* 2014;71:388-397.
7. Pinkerton L, Bertke SJ, Yiin J, et al Mortality in a cohort of US firefighters from San Francisco, Chicago and Philadelphia: an update *Occupational and Environmental Medicine* 2020;77:84-93.
8. Kenneth W. Fent, Barbara Alexander, Jennifer Roberts, Shirley Robertson, Christine Toennis, Deborah Sammons, Stephen Bertke, Steve Kerber, Denise Smith & Gavin Horn (2017) Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures, *Journal of Occupational and Environmental Hygiene*, 14:10, 801-814, DOI: 10.1080/15459624.2017.1334904

# ABOUT ESO

ESO (ESO Solutions, Inc.) is dedicated to improving community health and safety through the power of data. Since its founding in 2004, the company continues to pioneer innovative, user-friendly software to meet the changing needs of today's EMS agencies, fire departments, hospitals, and state EMS offices. ESO currently serves thousands of customers throughout North America with a broad software portfolio, including the industry-leading [ESO Electronic Health Record \(EHR\)](#), the next generation ePCR; [ESO Health Data Exchange \(HDE\)](#), the first-of-its-kind healthcare interoperability platform; [ESO Fire RMS](#), the modern fire Record Management System; [ESO Patient Registry](#) (trauma, burn and stroke registry software); and [ESO State Repository](#). ESO is headquartered in Austin, Texas. For more information, visit [www.eso.com](http://www.eso.com).

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