INCIDENT COMMAND SYSTEM PUBLICATION

Operational Guideline for Unmanned Aerial Vehicle (UAV)
Incursions During Emergency Events: Risks, Challenges,
and Mitigation Strategies

ICS 851

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This Document contains information relative to the Incident Command System (ICS) component of the National Incident Management System (NIMS). This is the same Incident Command System developed by FIRESCOPE. Additional information and documentation can be obtained from the following source:

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INTRODUCTION

Unmanned Aerial Vehicle (UAV) incursions during emergency situations, particularly during wildfires, have emerged as a significant challenge for firefighting operations in California. Unauthorized UAVs flown by hobbyists or commercial operators can interfere with critical airspace, delaying firefighting efforts, and posing safety risks to both responders and civilians. These incursions can ground firefighting aircraft, disrupt communications, and hinder the effectiveness of emergency operations. As the frequency of large-scale fires increases, the risk of UAV interference becomes a growing concern for California's fire services

This document describes stronger regulations, establishes clear mitigating guidelines, develops detection positions, and assists in enhancing detection systems and counter-UAV technologies to prevent unauthorized flights in restricted airspace. By enforcing no-fly zones, improving coordination between UAV operators and emergency responders, and utilizing technological tools to detect and neutralize rogue UAVs, this initiative aims to protect firefighting efforts, streamline operations, and improve safety management, enhancing coordination between agencies, and ensuring a more efficient, effective, and safer wildfire response.

DESCRIPTION

1. The Dual Nature of UAVs in Emergency Response

1.1 Benefits of Authorized UAV Use

It is crucial to acknowledge the immense benefits that UAVs can offer when integrated responsibly into emergency response:

- **Situational Awareness:** UAVs can provide real-time aerial views of incident scenes, offering responders a comprehensive understanding of the scope, progression, and potential hazards.
- **Damage Assessment:** Post-disaster, UAVs can quickly survey large areas to assess infrastructure damage, identify impassable routes, and pinpoint areas requiring immediate attention, often in conditions unsafe for human entry.
- **Search and Rescue (SAR):** Equipped with thermal cameras and high-resolution optics, UAVs can locate missing persons in challenging terrains or disaster zones more efficiently than ground teams alone.
- **Hazardous Material (HAZMAT) Monitoring:** UAVs can collect data from hazardous environments, reducing the risk of exposure for human responders.
- **Delivery of Supplies:** In remote or inaccessible areas, UAVs can deliver small, critical supplies like medical kits or communication devices.

1.2 Risks Associated with Unauthorized UAV Incursions

Despite these advantages, unauthorized UAV incursions during emergencies present significant hazards:

- **Interference with Manned Aircraft:** This is arguably the most critical risk. Firefighting aircraft (e.g., air tankers, helicopters), medical evacuation helicopters, and law enforcement aircraft operate at low altitudes during emergencies. An unauthorized UAV, even a small one, can cause a catastrophic mid-air collision, leading to loss of life, aircraft, and exacerbating the emergency. "If you fly, we can't," is a primary campaign message from firefighters.
- **Safety Hazards for Responders and Public:** A malfunctioning or crashing UAV can injure ground personnel or members of the public.
- **Disruption of Operations:** Even without a collision, the mere presence of an unauthorized UAV can force emergency aircraft to divert or land, halting critical operations like water drops on wildfires or patient transport, thereby prolonging the emergency and increasing damage or casualties.
- **Privacy and Security Concerns:** UAVs equipped with cameras can capture sensitive information or images of victims, violating privacy. In some scenarios, UAVs could also be used for malicious surveillance or to deliver dangerous payloads.
- **Legal and Financial Ramifications:** Operators of unauthorized UAVs face significant fines, imprisonment, and liability for damages caused. Emergency services may also incur additional costs due to delays or diversions.

2. <u>Regulatory Landscape and Enforcement Challenges</u>

Most aviation authorities worldwide, including the Federal Aviation Administration (FAA) in the United States, have established regulations to manage UAV operations, particularly concerning airspace restrictions during emergencies. Temporary Flight Restrictions (TFRs) are frequently issued over emergency incidents, designating the airspace as a no-fly zone for unauthorized aircraft, including UAVs.

However, enforcing these regulations presents substantial challenges:

- **Detection Difficulties:** Identifying and tracking small, fast-moving UAVs in complex airspace is difficult, especially in dynamic emergency environments.
- **Identification of Operators:** Pinpointing the operator of an unauthorized UAV in real-time is often nearly impossible, hindering immediate intervention and subsequent prosecution.
- **Lack of Public Awareness:** Despite outreach efforts, many recreational UAV operators remain unaware of airspace restrictions, TFRs, or the severe consequences of interfering with emergency operations.
- **Technological Limitations:** While counter-UAV technologies are emerging, their deployment in every emergency scenario is not yet feasible due to cost, complexity, and legal considerations.

3. <u>Case Studies</u>

Numerous incidents underscore the severity of UAV incursions:

- **Wildfires:** During major wildfires in California (ex. Palisades Fire) and other states, unauthorized UAVs have repeatedly forced firefighting aircraft to ground, allowing fires to spread unchecked and endangering communities. In some instances, unauthorized UAV sightings have led to complete stand-downs of aerial firefighting efforts, directly contributing to increased property damage and fire duration.
- **Natural Disasters:** Following hurricanes or earthquakes, unauthorized UAVs have been reported flying over disaster zones, impeding critical search and rescue efforts and potentially interfering with legitimate relief flights.
- **Sporting Events/Public Gatherings:** While not strictly "emergency events," incursions at large public gatherings highlight the security risks and the challenge of managing unauthorized UAVs in crowded environments.

4. <u>Mitigation Strategies and Recommendations</u>

Addressing UAV incursions during emergency events requires a multi-pronged approach involving education, technology, legislation, and inter-agency collaboration:

4.1 Legal and Regulatory Framework

- **Implement Temporary Flight Restrictions (TFRs):**
  - Emergency response agencies should work with aviation authorities (such as the FAA, EASA, etc.) to issue Temporary Flight Restrictions (TFRs) immediately when an emergency arises. These TFRs should clearly specify the geographical boundaries where UAVs are not allowed to operate.
  - Establish fast-track approval processes for emergency situations so authorities can quickly enforce restrictions.
  - Coordinate with FAA to enforce and implement TFR regulations
- **UAV Operation Restrictions in Emergencies:**
  - Enforce laws that restrict all non-emergency UAV operations (both recreational and commercial) in emergency zones. The penalties for non-compliance should be severe enough to deter violations, including heavy fines and possible jail time for repeat offenders.
- **Automatic Geofencing Regulations:**
  - Mandate that all commercial UAVs come pre-programmed with geofencing capabilities that automatically prevent them from entering restricted airspaces, especially in emergency zones. For recreational UAVs, it's crucial to have automatic geofencing as a built-in feature.

4.2 Real-Time UAV Detection and Monitoring Systems

- **Deploy UAV Detection Technology:**
  - Use **radar and radio frequency (RF) detection systems** to monitor and track UAV activity in restricted airspace. This helps to instantly identify unauthorized UAV activity and take action before the UAV poses a threat.
- **Live Video Surveillance and AI Integration:**
  - Implement visual tracking systems such as high-definition cameras, coupled with AI-powered software to detect and classify UAVs in real-time.
- **Automated Alerts to Authorities:**
  - Set up automated systems that instantly alert emergency responders and authorities whenever an unauthorized UAV is detected within restricted airspace. Alerts can include the UAVs location, type, and trajectory.

4.3 Communication with UAV Operators

- **Notify UAV Operators of No-Fly Zones:**
  - Publicly announce the establishment of no-fly zones during an emergency through **UAV-specific apps** and online platforms that provide real-time notifications to unauthorized UAV operators about emergency areas and flight restrictions.
  - Work with UAV manufacturers to push real-time notifications directly to UAV operators' devices, automatically restricting their flight.
- **Registration and Remote Identification:**
  - Ensure that **all** UAVs are **registered** with relevant authorities and have **remote identification capabilities**. This allows authorities to quickly identify unauthorized UAV operators and take enforcement action if necessary.
- **Use of UTM (Unmanned Traffic Management) Systems:**
  - Implement **UTM systems** to allow real-time communication between UAVs, air traffic control, and emergency responders. This would enable authorities to communicate restricted zones and manage UAV access effectively.
  - Systems can provide a layer of enforcement by automatically updating flight paths and allowing authorities to intervene remotely.

4.4 Operational Coordination During Emergencies

- **Coordination Between Emergency Services and UAV Operators:**
  - Establish a **clear communication channel** between emergency responders (firefighters, Local Law Enforcement, FBI, DOD) and authorized UAV operators. This would ensure that any authorized UAV flights for emergency operations do not conflict with or hinder emergency activities.
  - Use **airspace coordination tools**, ensuring that authorized UAVs are given clear access and other unauthorized UAVs are blocked from entry.

- **Temporary Authorization for Emergency UAV Operations:**
  - Allow **special permits** or **temporary flight authorizations** for emergency UAVs that are actively supporting the operation (e.g., UAV used for hot spot recon or aerial surveillance).
  - Set up a system where UAV with emergency authorization can communicate and request access to restricted areas.

4.5 Education and Public Awareness Campaigns

- **Public Awareness of UAV Laws in Emergencies:**
  - Launch campaigns to educate the public about the dangers and legal ramifications of flying UAVs in emergency incidents. Unauthorized UAVs flying in these zones can impede rescue efforts, endanger lives, and violate federal laws.
  - Publicize cases where UAV incursions during emergencies have led to significant consequences.
- **UAV Operator Certification:**
  - Require all UAV operators to undergo **certification** on how to operate UAVs safely, including knowledge of where UAV operations are permitted during emergencies.

5. Conclusion

UAV incursions during emergency events represent a critical challenge that undermines the safety and effectiveness of response operations. While UAVs offer transformative capabilities for emergency management, the risks posed by unauthorized and irresponsible flights are substantial and have already led to catastrophic, and near fatal incidents. Addressing this issue requires a concerted effort encompassing robust public education, the strategic deployment of detection and mitigation technologies, stringent legal frameworks, and seamless collaboration among all stakeholders. By proactively implementing comprehensive strategies, societies can harness the immense potential of UAVs for public good during emergencies while simultaneously safeguarding responders, communities, and the integrity of critical operations. The goal is to cultivate a culture of responsible airspace use, ensuring that when emergencies strike, the skies remain clear for those who are there to help.

EXTERNAL LINKS

- NWCG Standards for Fire Unmanned Aircraft Systems Operations, PMS 515
  - https://fs-prod-nwcg.s3.us-gov-west-1.amazonaws.com/s3fs-public/publication/pms515.pdf?VersionId=35n.vZ7uZS4uxaXpTayUmiCievn1RaLo
- National Interagency Fire Center
  - https://www.nifc.gov/fire-information/statistics/uas-incursions
- UAV Incursion Interference with Wildfire Suppression Activities on Federal Lands over the Past 5 years
  - https://www.fs.usda.gov/sites/default/files/8741538-enclosure-2021-11-2.pdf
- If you Fly, We Can't
  - https://www.fs.usda.gov/managing-land/fire/aviation/uas/if-you-fly
- Fire Aviation News
  - https://fireaviation.com/tag/drone-incursion/
- UAV Sightings Near Airports
  - https://www.faa.gov/uas/resources/public_records/uas_sightings_report