WRITTEN STATEMENT FOR THE RECORD

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Introduction

Good morning Chairmen Guest and Strong and the Ranking Members and members of the Border Security and Enforcement and Emergency Management and Technology Subcommittees. On behalf of myself, our 130 center employees who are all cleared and US Citizens, and the University of Alabama in Huntsville, I bring you greeting from Alabama. Thank you for inviting me to testify today April 1, 2025 on "Exploring the Use of Unmanned Aircraft Systems Across the DHS Enterprise"

My name is Jerry Hendrix and I serve as the Executive Director of one of our 17 University research centers focused on performing autonomous aerospace research at the University of Alabama in Huntsville (UAH). Our center is part of a tier 1 research university that ranks 6th in federal investment in aeronautical and aerospace engineering research. The center specializes in autonomous research focusing on uncrewed systems and counter-uncrewed systems. Our unmanned aircraft system (UAS) disaster research has been recognized nationally by the Commercial Drone Alliance in testimony to the House Space, Science and Technology Committee in 2023. UAH's research was specified as the one of the top 8 UAS programs to "bring benefit to the American People." That research was focused on "UAS Use in Natural and Human Disasters".

Over the past 20 years, I have been involved in UAS development, operations, training and policy development. I have been involved in over 4,000 separate UAS operations in testing, exercises and disaster responses working across several academic institutions and government agencies. While at Texas A&M University, I served as the Air Wing 1 Commander for the state

of Texas and the Federal Emergency Management Agency (FEMA) Texas Task Force 1 for disaster response while also serving as the Executive Director of the Texas Federal Aviation Administration (FAA)-designated UAS Test Site. While at UAH, I recently completed my term as President of Huntsville's Pathfinder Chapter of the Association of Uncrewed Vehicle Systems International (AUVSI) and led our UAS research at UAH. That research includes UAS use in disasters research and exercises, deployment of UAS to real border operations and real disasters, uncrewed threat analyses, development of uncrewed systems as threat replicas and development of uncrewed systems used by the DOD. Our center has supported the Department of Homeland Security (DHS) in evaluating and using UAS as a viable technology and evaluations of counter insurgency systems. The university holds a Cooperative Research Agreement with NOAA for UAS use in disasters. A majority of our center's staff are currently FEMA trained for disaster response.

An Overview of Research/Operations Results

Applied research focused on the DHS domains has resulted in many observations documented within this testimonial statement. The broad base of our experience researching and operating UAS is with FEMA, DHS Science and Technology, CBP and in some cases supporting critical infrastructure protection. In UAS, our center trains DOJ agents in UAS operations, develops UAS for DOD including threat replicas, performs multiagency threat analyses and supports the FAA and the National Oceanic and Atmospheric Administration (NOAA) research applications. This testimony will focus on these areas based on lessons learned supporting the DHS enterprise.

There are several primary areas of concern with UAS Operations in the DHS Enterprise:

1. Operational discipline across the UAS domain especially when it comes to operational procedures compliance and controlling the operational environment;
2. Overburden of regulations and processes imposed by multiple agencies in training and operations;
3. Protection of our own assets and infrastructure from unwanted and sometime nefarious UAS incursions;
4. The cost of systems at large based on the industrial complex costing models;
5. The challenges of introducing new technology and capabilities that are mission focused, low cost and expendable or maintainable.

Lessons Learned from the Use of UAS Across the DHS Enterprise

For the next couple of minutes, I would like to discuss the lesson learned from over 4000 UAS missions and operations of which a large number relate to the DHS mission set.

Technology and Common Operational Challenges

- Our research found that the current status is referred to by existing UAS operators as the "Wild West". This is because of the presence of untrained UAS operators and non-cooperative UAS operators who appear during operations supporting disasters or missions.

- Operational discipline is extremely important. Consistent operational procedures including checklists, checklists and even more checklists must be used for any operation and response. This will ensure a safe and effective operation. The training and credentialing of operators to a standard set of Minimal Operational Proficiency Standards (MOPS) would be extremely valuable. The following 7 areas of proficiency are highly recommended:
    1. Communications – Understanding terminology and its appropriate use for command operations;
    2. Pilot Dexterity and Skills – Proficiency in the skill, precision and finesse of flying;
    3. Visual Acuity – Competence in using UAS for area scan searches using different techniques;
    4. Airspace Operations – Understanding regulatory frameworks (Federal, State and Local) and limitations;
    5. Understanding Command Operations – How to operate with an Air Boss and FEMA's established Incident Command Structure (ICS);
    6. Performance of Safety and Risk Analysis – Institutionalized safety practices and an identification process for risks and mitigation strategies;
    7. Knowledge of UAS, Sensors and Data Products – Understanding which UAS and sensor sets best fit the mission need and which data products are needed immediately and to be stored for possible future actions.
- UAS development and fielding costs should continue to go down over time as technology evolves unless regulatory restrictions force unnecessary constraints. Autonomy, swarming (multi-aircraft operations), Artificial Intelligence/Machine Learning (AI /ML), Beyond Visual Line of Sight (BVLOS) operations, special purpose solutions and other technology uses offer the ability to respond more rapidly and effectively. Research is needed to incorporate these technologies while regulations must be adjusted to safely allow their introduction. Such technology insertion research could be a part of a National Security and Technology Innovation Program to identify novel UAS technology that is simple, low cost, highly productive to mission needs and rapidly reconfigurable to adjust as the mission adjusts and Made and Manufactured in America! The result would be highly capable, low cost UAS, mission-focused solutions.
- Regulations are most necessary for UAS operations but hinder UAS for both disaster response exercises and DHS training and operational exercises. We need to train and plan as we operate! Federal agencies might violate a law if they do any detection or mitigation against a drone without specific authorization. Those authorizations should be streamlined. I have provided those regulations in my references.
- Overall, the use of mechanisms to control the airspace (such as an Automated Air Boss when DHS is operating) would prohibit unwanted UAS operations for hobbyists or non- cooperative entities.

- Fleet control and an understanding all communications systems and operational frequencies must be known by the incident command structure and Air Boss.
- One of my concerns is the vulnerability of our nation's airports, highways, maritime transportation systems, railways and mass transit, and pipeline systems to an unwanted UAS drone attack. If we recall the total paralysis that the nation experienced after 9-11, it's not hard to imagine the impact of a successful UAS attack on any major airport or transportation system in the country. Consider the possibility of an attack on the Mississippi River systems. Our transportation network could be brought to its knees by a single strike. Therefore, the effectiveness of counter uncrewed and UAS systems is of the extreme importance. Counter UAS systems need to be tested and validated against certified threats by independent agents. The testing methods and standards should be established by the independent agents and paid for by equipment vendors.

First Responder Challenges

- It is critical to offer appropriate assistance in the event as agreed to and tasked by Incident Command. Those tasking may include collecting data for the tax assessor or assisting FEMA evaluators to determine storm surge or even assisting in active Search and Rescue events. The right UAS strike team, technology (UAS and Sensors) are critical to success.
- Exercises and training should include the integration of UAS Strike Teams within the response organizations reporting to Incident Command as documented in the FEMA ICS construct.
- First responders can gain efficiency if they can exercise realistically by employing BVLOS operations, Special Government Interests (SGIs) and Temporary Flight Restrictions (TFRs) just as they would in a real disaster or emergency response. This is not currently allowed.
- Rapid field data assessment is needed in a concise and consistent manner.
- Authority to approve special emergency Certificates of Authorization or Waiver (ECOAs) or UAS Disaster Operations should be allocated to Incident structures using Pre-approved TFR training and processes as opposed to using the FAA's System Operations Support Center (SOSC) which may take days.
- Airspace approvals must be done in a timely manner and approved operations with limited interference must be done more efficiently. Refer to findings based on research, interviews, and exercises in the Alliance for System Safety of UAS through Research Excellence (ASSURE) A52 FAA Final Report, Reference 2.
- Technology like electromagnetic systems must control the response areas keeping unwanted incursions from happening. Operations must gain approved spectrum usage and airspace operational limits. Incidents of UAS operations around manned aviation has been seen in fire and flooding responses.

- Although Standard Operating Procedures (SOPs) are helpful, MOPS would greatly improve response. However, funding is lacking to institutionalize MOPS across all first responders
- Operations in extreme temperatures may impact the reliability of UAS and Sensor operations and certainly impacts operator's ability to respond effectively. Research is needed in this area of disaster-focused UAS.
- Utilization of tools like mobile internet, social media, signal chat and Android Team Awareness Kit (ATAK) are beneficial in performing airspace deconfliction and resource management in disparate response areas like in the North Carolina Mountains.
- The ability to conduct BVLOS operations is a must for first responders. This can be accomplished through the use of a global network, such as an Automated Air Boss, which overlays the disaster area with the locations, altitudes, speed and direction of aircraft and drones.
- Our research led us to build a Beyond Part 107 for First Responders booklet to help first responders interpret the Part 107 law.

Border Challenges

- Border operations would be better executed if allowed to exercise realistically using national airspace training locations like the UAS and CUAS Test Range at Huntsville International Airport (HSV) with appropriate approvals/waivers from the FAA, Federal Communications Commission (FCC), and Department of Justice (DOJ).
- Technological advances like automated Air Boss using AI/ML overlaid onto existing solutions like ATAK would expedite emergency responses and provide airspace control to "non-cooperatives".
- UAH operates an open-source threat analysis for several federal organizations. We produced an open source threat report on the southern and northern borders and augmented it with UAS use on the border. Some of the results are as follows:
    - Fiber Optic controlled UAS sometimes referred to as "tethered drones or Dark Drones" use fiber optic communications. These UAS are not susceptible to jamming with radio signals and can only be destroyed by blinding the fiber or cutting the tether. Some are small in size but have control fibers thousands of kilometers long. The process originated in the Ukraine-Russia war and now is available on line. Terrorist organizations have begun or will begin to use this technology shortly.
    - Another technique now being employed by cartels also came from the Ukraine-Russia war and that is the ability for small agile UAS known as weaponized drones to drop bombs and other incendiary devices.
    - In addition, cartels and drug lords are using their own drones for surveillance of border agent movements and cargo deliveries

Conclusion – Support is needed for more effective and efficient responses

In conclusion, I ask for these committees' assistance in allowing our DHS enterprise including our agents, first responders and supporting partners more leeway and freedom to research, test and conduct of exercises. Changing regulations for this support and allocating resources for more research into supporting technology will allow more effective and efficient responses.

Agents and responders could benefit from a MOPS-like program to establish and standardize consistent safe and effective UAS operations that is focused on mission objectives.

I also want to point out that establishing a National Security and Technology Innovation program that may mimic what has transpired in the DOD would generate technology specified by DHS. This program would be laser focus on applications that are simple, low cost, highly productive to mission needs and rapidly reconfigurable and Made and Manufactured in America!

And lastly, I would like to offer the concept of testing of any counter systems by using certified developed threats that replicate the threats we see today across peer nations and adversaries.

Thank you for your attention and consideration. I look forward to continued discussions and want to assure you that UAH will continue to support research to protect our citizenry, assist our soldiers and agents, get disaster victims on the road to recovery, and save lives.

Please note my references and resources as documented.

References & Resources

1) FAA Memorandum dated February 29, 2024: "Updated FAA Priorities – New Test Plan for A11L.UAS.090, Evaluation of Unmanned Aircraft Systems (UAS) Integration Safety and Security Technologies in the National Airspace System (NAS) Program (A60)", Matt Novak and Tricia Fantinato

2) UAH FAA A52 Final Report, "ASSURE A52: Phase II - Preparation for Disaster Preparedness and Response using UAS in the NAS with Coordination Across First Responders", October 2024.
chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://assureuas.com/wp-content/uploads/2021/06/A52-Final-Report-V13_FINAL.pdf

3) UAH FAA A62 Final Report, "ASSURE A11L.UAS.68_A62: Disaster Preparedness and Emergency Response Phase III", March 2025
chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.assureuas.org/wp-content/uploads/2022/03/ASSURE_A11L.UAS_.68_A62_Final_Report_v3.pdf

4) NewsNation Report March 21, 2025 "US Unprepared for Dark Drone"

5) "How the U.S. is confronting the threat posed by drones swarming sensitive national security sites", CBS News, "60 Minutes," originally broadcast 3/16/25.
https://www.cbsnews.com/news/drone-swarms-national-security-60-minutes-transcript/

6) Detection: The Pen/Trap Statute, 18 U.S.C. §§ 3121-3127, criminalizes the "use" or "installation" of a "device" or "process" that "records," "decodes," or "captures" non-content information like dialing, routing, addressing, or signaling ("DRAS") information. See Interagency (DOJ, DOT, FCC, DHS) "Advisory on the Application of Federal Laws

to the Acquisition and Use of Technology to Detect and Mitigate Unmanned Aircraft Systems" dated August 2020.

7) Detection: The Wiretap Act (also known as Title III), 18 U.S.C. §§ 2510 et seq., prohibits, among other things, "intentionally intercept[ing]" the content of "any . . . electronic communication[,]" unless it is conducted pursuant to a court order or a statutory exception applies. See Interagency (DOJ, DOT, FCC, DHS) "Advisory on the Application of Federal Laws to the Acquisition and Use of Technology to Detect and Mitigate Unmanned Aircraft Systems" dated August 2020.

8) Mitigation: 18 U.S.C. § 31(a)(1), The use of non-kinetic or kinetic solutions may implicate federal criminal prohibitions against, among other things, intercepting and interfering with communications, damaging a "protected computer," and damaging an "aircraft." The term "aircraft" refers to "a civil, military or public contrivance invented, used, or designed to navigate, fly, or travel in the air." See Interagency (DOJ, DOT, FCC, DHS) "Advisory on the Application of Federal Laws to the Acquisition and Use of Technology to Detect and Mitigate Unmanned Aircraft Systems" dated August 2020.