Use of Unmanned Aerial Vehicles in Trespass Abatement

Presented by
Rich Gent
President/CEO Hot Rail, LLC
State Director Nevada Operation Lifesaver

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trespass workshop participants
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Background and Experience

• 37 years in Naval Intelligence (Intelligence Collection Management)
• 18 years in rail safety program: Operation Lifesaver (State Director)
• Owner of rail security firm: Hot Rail, LLC
• NV POST Instructor (basic)
• NV Terrorism Liaison Officer
• Washoe County Sheriff’s Office Volunteer
Background and Experience

Steve Endacott and Flight Test Concierges (FTC)

- 20 years FA-18 Pilot, squadron commander
- 20 years UAV test consultant to DoD
- 20 years City Emergency Manager
Objectives

• What do we want you to walk away with from this presentation

• UAS’ can currently provide trespass Situational Awareness (SA)
• Capabilities, Limitations and integration of UAS Trespass SA
• The military has done this. Don’t reinvent the wheel
• Start now to develop UAS trespass CONOPS/technical requirements
• Can an Unmanned Aerial System-
  – Provide a warning to a train crew of an object or person on the track
    • During Day or Night
    • In all weather conditions
    • Out to 3 miles in front or the train

• **YES, and the capability exists today**

• But, is the train crew the right choice?
UAS’s (drones) are Coming
Will Rail be Ready?
Well, actually they’re here

“BNSF drones will patrol the track”
“BNSF has approval to patrol track, property with drones”
First, a little nomenclature control:

• Unmanned Aerial Vehicle (UAV):
  – A UAV, also known as a drone, is an aircraft without a human pilot on board. Its flight is controlled either autonomously by computers or under the remote control of a pilot in the Ground Control Station (GCS)

• Unmanned Aerial System (UAS):
  – The entire system that supports UAV operations, including the GCS, the pilot, data links, sensors, etc.
Unmanned Aerial System

- Air Vehicle
- Antenna/Data Link
- Control Station
- Mobile Receivers
The UAV Technical Game Changer

During the last decade, UAS have experienced an explosion in capabilities, regulation reform, procedures development and technology.

- Size
- Sensors
- Data Links
- Endurance
- Automation
- Control Stations
- Product Exploitation
- Testing Opportunities
- Information Distribution
The Problem
Can a UAS reduce loss/incidents

• Trespassing (criminal/public) on increase
  • Who is trespassing?
  • Where are they trespassing?
  • Where do they go after illegal activity?
  • Planned/inadvertent interference by public
Solutions to date

• Education
  • Operation Lifesaver (OL)
  • Rail sponsored
• Engineering
  • Fencing
  • Fixed camera system
• Enforcement
  • Surge Ops
  • S4 campaign

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Talking to Railroaders about UAS’s

• “Every time I talk to you I learn something different.”
• “It’ll cost too much, the railroads will never pay for that.”
• “I could use a drone for cable theft.”
• “What can I use it for?”
• “An overview of the capabilities would be helpful.”
• “I guess I could use it in high traffic areas.”
• Is it time to explore new strategic and technological solutions?
• Are there any Game Changers out there....
• Are there potential partnerships that should be explored?
UAS Procedural Maturity

Military and Industry have already done a lot of the heavy lifting:

- Extensive flight experience, pilot training
- Reliable aircraft and airspace procedures
- UAS Control and Communication Architectures
- Plus.... Employed UAS in similar tasks and missions that the railroad community can leverage.

- Such as:
Missions and Experience that Directly Transfer to Rail Operations

- Convoy Escort
- Route screening
- Perimeter Security
- Damage assessment
- Automated change detection
- Data and communications relay
- Search and recovery operations
UAS General Capabilities

- Full-color nose camera that the pilot uses primarily to navigate the craft
- Variable aperture camera (similar to a traditional TV camera)
- Variable aperture infrared camera for low-light and night viewing
- Synthetic aperture radar (SAR) for seeing through low visibility
- Other “scientific sensors”
Synthetic Aperture Radar Imagery
Other 50 pound head items

- Hyper and Multi-spectral
- Two Color Multi-view
- Coherent Change Detection
- Light Detection and Ranging (LIDAR)
- Time Lapse Viewing
UAS Downside

- Who’s watching the sensors
- Intelligence Oversight (legal issues)
- Wind
- It’s a duck
- Soda Straw
- MIJI

German Heron Drone Hacked and Crashed by Taliban in Afghanistan

Ways How To Hide From Drones”
December 23, 2013, by Ken Jorgustin

“How to hide from Predator Drones UAV – Unmanned Aerial Vehicles Survival Guide”
Posted on 03/24/2013 by 2LT Website Administrator — 29 Comments ↓

“How To Block IR Infrared Thermal Imaging”
February 24, 2013, by Ken Jorgustin

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28101. Rail Police Officers
Under regulations prescribed by the Secretary of Transportation, a rail police officer who is employed by a rail carrier and certified or commissioned as a police officer under the laws of a State may enforce the laws of any jurisdiction in which the rail carrier owns property, to the extent of the authority of a police officer certified or commissioned under the laws of that jurisdiction, to protect—

(1) employees, passengers, or patrons of the rail carrier;
(2) property, equipment, and facilities owned, leased, operated, or maintained by the rail carrier;
(3) property moving in interstate or foreign commerce in the possession of the rail carrier; and
(4) personnel, equipment, and material moving by rail that are vital to the national defense.

“Border-patrol drones being borrowed by other agencies more often than previously known”
The Washington Post
National Regulatory Game Changer

• In the FAA Modernization and Reform Act of 2012, Congress directed the FAA to establish a test site program to integrate UAS into the National Airspace System.

• Six test sites were selected from over 50 applicants.

• These sites are searching for UAV test and test scenarios that will benefit industry and the public at large.
Current Commercial UAS use in Railroad Operations

- Germany
- France
- India
- Netherlands
- Israel
- UK
- CBP
- Transit Authority
- BNSF

“German Railway Operator Deploys Drones in War on Graffiti Artists”

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Transit Authority UAS
Discussion on Utilization

• CONOP Considerations:
  – Assigned to a Subdivision?
  – Assigned to a specific train?
  – Assigned to a specific unit/individual?
  – What sensor suite, where does the info go?
  – Individual railroads or nationwide protocols?
  – Communication Paths?

• Will the benefit outweigh the cost
  – Mutual Use Agreement
Costs associated with drone use

- Cost vs Benefit
- Infrastructure/Logistics
- Manpower
- Training
- Maintenance

The drones cost $3.36 an hour to operate, which compares to $250 to $600 an hour for a manned aircraft, Miller said. The drones cost $30,000 to $50,000 each to buy, about the price of a squad car, he said. “Bloomberg”

“For Fiscal Year 2010, DHS reported that its Predator B (a variant of DOD’s Reaper) costs approximately $3,234 per flight hour,” the U.S. Government Accountability Office reported in 2011.
Hurtles before UAS use

• Certificate of Authorization
• FAA approval
  – Safety of Flight Procedures
  – Spectrum Management
  – Aircraft Certification
  – Pilot Credentials
  – Airspace Design

• But...it’s changing
What’s happening now

• Still no comprehensive guidance from FAA
• Some limited COAs granted (Rail, Film, Ag, Mining...)
• Drone manufacturers talking to railroad
• FAA/NASA looking at future UAV integration into National Air Space
New Business Models and Processes for Developing UAS Integration Solutions

• Interdisciplinary Professional Teaming of Users: Railroad, Regulators, Aviation, Security, Intelligence, Flight Testing and Training and Communities.

• Leverage FAA UAV Test Site Initiative.....like Nevada that has companies with experts.

• Have the discipline to do it right!!!

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Recommended Next Steps

1. Develop baseline Concept of Operations (CONOPS)
2. Develop and conduct demonstrations with the best of best
3. Develop procedures and training
4. Develop teaming opportunities
5. Deploy to where UAS would make the most sense
So now what for this workshop

- Start CONOPS now and get professional help to:
  - Develop a prioritized requirements list where UAVs may provide solutions sets and associated CONOPS
  - Explore technical options for:
    - Effectiveness
    - Cost efficiency
    - Low impact on operations or personnel

- Move forward with a plan, don’t reinvent the wheel and don’t get sold by the first vendor.
Questions

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