UNMANNED AERIAL SYSTEMS (UAS)

SYSTEMS - REGULATIONS - CONSIDERATIONS

Presented to the Ohio Aggregates and Industrial Minerals Association

November 18, 2016

SUMMARY:

- Drones? UAS? UAV? Types of Aircraft and other Definitions
- Rules governing the use of UAS
- Penalties and liabilities
- Yep, you guessed it.....Insurance
- Operations

DRONES? UAS? UAV? WHY ALL THE NAMES?

DRONE: Dynamic Remotely Operated Navigation Equipment

UAS: Unmanned Aerial System

UAV: Unmanned Aerial Vehicle

sUAS: Small Unmanned Aerial System (less than 55 lbs.)

Commonly we call the "bird" the Drone or a UAV and we call all of the hardware and electronics, including the bird a UAS.

UNMANNED AIRCRAFT SYSTEM

An unmanned aircraft system (UAS) comprises an unmanned aerial vehicle (UAV), colloquially known as a **drone**. The aircraft is controlled either autonomously by computers and guidance systems in the vehicle or under the remote control of a pilot on the ground or in another vehicle.





TYPES OF DRONES

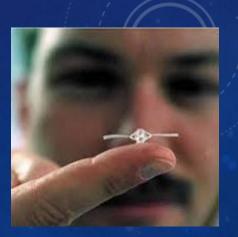
Fixed Wing: they all pretty much look like airplanes

Rotary Wing: they are all some variation of a helicopter

- Tri copter
- Quad copter
- Octocopter
- Multicopter
- Hexacopter
- Insectocopter?

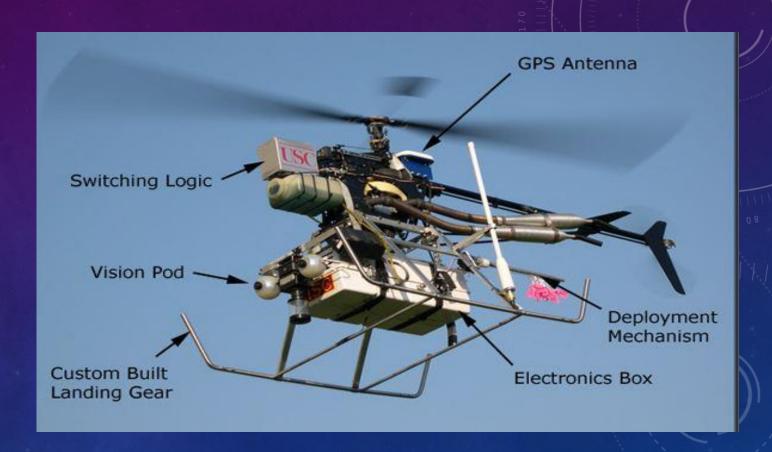






EQUIPMENT FOUND ON DRONES

- GPS
- IMU
- Still frame cameras
- Video cameras
- Lidar sensors
- Thermal sensors
- Fixed mounts
- Gimbel mounts
- Coming soon....pizza?





GPS

The Global Positioning System (**GPS**) is a space-based satellite navigation system that provides **location** and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more **GPS** satellites.

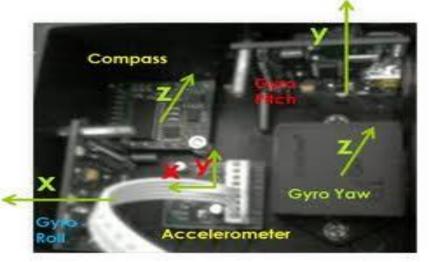




IMU

An inertial measurement unit, or **IMU**, is an electronic device that measures and reports on a craft's velocity, orientation, and gravitational forces, using a combination of accelerometers and gyroscopes, sometimes also magnetometers







LIDAR

Light Detection and Ranging is a remote sensing method that uses light in the form of a laser to measure ranges to the Earth. These light pulses combined with other data recorded by the airborne system generate precise, three-dimensional information about the shape of the Earth.

WHOSE FLYING?

- Military
- Recreational Hobbyists
- Commercial operators

HOW ARE "RECREATIONAL AND HOBBY" DEFINED?

The FAA's defines this to be

- The pursuit outside one's regular occupation engaged especially for relaxation
- The refreshment of strength and spirits after work
- A means of refreshment or diversion
- Fun

CURRENT RULES GOVERNING THE USE OF DRONES - RECREATIONAL - HOBBY

- Follow community-based safety guidelines, developed by organizations such as the Academy of Model Aeronautics.
- Fly no higher than 400 feet and remain below any surrounding obstacles.
- Keep your sUAS in eyesight at all times.
- Remain well clear of and do not interfere with manned aircraft operations, and you must see and avoid other aircraft and obstacles at all times.
- Do not intentionally fly over unprotected persons or moving vehicles, and remain at least 25 feet away from individuals and vulnerable property.
- Contact the airport and control tower before flying within five miles of an airport or heliport.

CURRENT RULES GOVERNING THE USE OF DRONES

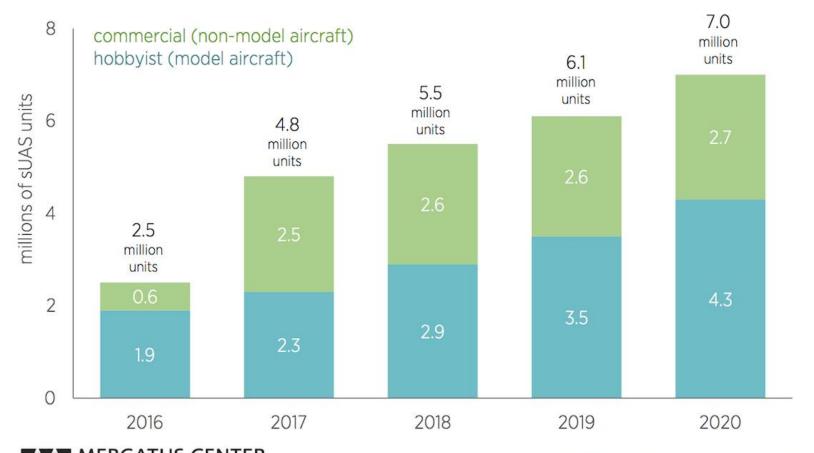
- RECREATIONAL HOBBY
- Do not fly in adverse weather conditions such as in high winds or reduced visibility.
- Do not fly under the influence of alcohol or drugs.
- Ensure the operating environment is safe and that the operator is competent and proficient in the operation of the sUAS.
- Do not fly near or over sensitive infrastructure or property such as power stations, water treatment facilities, correctional facilities, heavily traveled roadways, government facilities, etc.
- Check and follow all local laws and ordinances before flying over private property.
- Do not conduct surveillance or photograph persons in areas where there is an expectation of privacy without the individual's permission

COMMERCIAL APPLICATIONS FOR UAS?

- Surveying and mapping (orthophotos, topographic surveys, volumetric determinations)
- Inspection (equipment, pipelines, bridges, turbines, dams, construction, agriculture)
- Agriculture (crop stress, precision watering and fertilization, pest control, yield prediction)
- Motion picture filming
- News/Journalism
- Law Enforcement (surveillance, border protection, crime scene and accident mapping)
- Archaeology
- Coming Soon... Yogurt delivery?

PROJECTED HOBBY AND COMMERCIAL DRONE USE







Source: FAA Aerospace Forecast, Fiscal Years 2016–2036. Produced by Eli Dourado and Andrea Castillo, May 2016.

ECONOMICS

 The Association for Unmanned Vehicle Systems (AUVSI), the worlds largest non-profit organization representing 7,500 members advancing unmanned systems predicts that by 2025 drones will create approximately 100,000 new jobs and about \$82 billion in economic activity.

 Wow! I'm going to quit my job (OR DO THIS AT MY JOB) and start making/saving money with a drone. It's probably easy?

RULES-REGULATIONS-TIMELINE

In November of 2013 the U.S. Transportation Secretary delivered the "UAS Comprehensive Plan" to Congress which stated a "Notice of Proposed Rulemaking" was under development with the intent to provide safe access of small UAS to the National Airspace. The notice was proposed to be released in 2014.

In May 2014, while final rules are still being drafted FAA begins accepting petitions for exemption to operate UAS in the NAS under Section 333 of the FAA Modernization and Reform Act of 2012

In 2014 the House of Representatives Appropriations Committee grants the FAA \$3 million in additional funds to complete the rulemaking process

In February 2015 the FAA releases the proposed new rules and begins accepting comments .

In March 2015 FAA released a new interim policy to speed up the Section 333 authorization process allowing commercial access to the NAS below 200'.

At the close of the comment period in April 2015; 4,669 comments are received and the release of the new rules is targeted for September 30. This deadline is missed.

In October 2015 the FAA Implements the federal drone registration program.

• IMPORTANT NOTICE:

• The FAA's final rule for small, unmanned aircraft went into effect on August 29, 2016.

 UAS users who want to fly for commercial use must follow these regulations.

PART 107 RULES SUMMARY

Part 107

Operate to part 107 rules

Remote Pilot Certificate (part 61)

No operations directly over non-participants (this could be a big deal)

400 Ft AGL over ground and structures

Visual Observer encouraged but not required

Operations based on airspace

Operations from vehicle allowed in sparsely populated areas

Permission for flight over private property not required

No NOTAM required

Expanded permission requires a Waiver

- Remote Pilot requirements: Part 107
- Must be at least 16 years of age
- Must hold a remote pilot airman certificate with a small UAS rating or be under the direct supervision of someone holding a remote pilot airman certificate. (FAA administered test)
- Must pass the applicable Transportation Security Administration (TSA) vetting

OPERATING RULES PART 107

- Must fly under 400 feet above ground level (AGL) or, if flying at an altitude higher than 400 feet
 AGL, stay within 400 feet of a structure
- Must keep the UAS in visual line of sight either by the remote pilot in command or a visual observer*
- Must fly during daylight hours* or civil twilight hours (30 minutes before official sunrise to 30 minutes after official sunset, local time) with appropriate anti-collision lighting
- Must fly at or below 100 mph*
- Must yield right of way to manned aircraft*
- Must not fly over people*
- Must not fly from a moving vehicle unless you are in a sparsely populated area*
- *If you want to operate UAS for commercial purposes outside of these rules, you may apply
 online for a certificate of waiver. The FAA will grant waivers if operation can be performed safely
 but may otherwise not be allowed under Part 107.

- UAS requirements: Part 107
- Registration required
- Aircraft marking required
- Must weigh less than 55 lbs.
- Must undergo pre-flight check by remote pilot in command.
- Operations in Class B, C, D and E airspace are allowed with the required Air Traffic Controller (ATC) permission
- Operations in Class G airspace are allowed without ATC permission

Part 107 Airspace Requirements



- Operations in Class G are allowed without air traffic control authorization
- Operations in Class B, C, and D airspaces, and Class E airspace designated for airports, require authorization from ATC





Blue-introduced

Red -defeated

Yellow-passed 2 Chambers in place

Purple-passed 1 Chamber

Green-Laws

NO statewide regulations in Ohio at this time.

ALL STATES



 http://www.ncsl.org/research/transportation/currentunmanned-aircraft-state-law-landscape.aspx

JUST WHAT DOES "COMMERCIAL" MEAN ANYWAY?

- Selling photos or videos taken from a UAS
- Using UAS to provide contract services, such as industrial equipment or factory inspection
- Using UAS to provide professional services, such as security or telecommunications or mapping
- Using UAS to monitor the progress of work your company is performing
- Business use, for compensation or for hire
- What is I fly a drone and only sell the products derived from the imagery?.....Commercial use.

PENALTIES FOR OPERATING OUTSIDE OF THE RULES

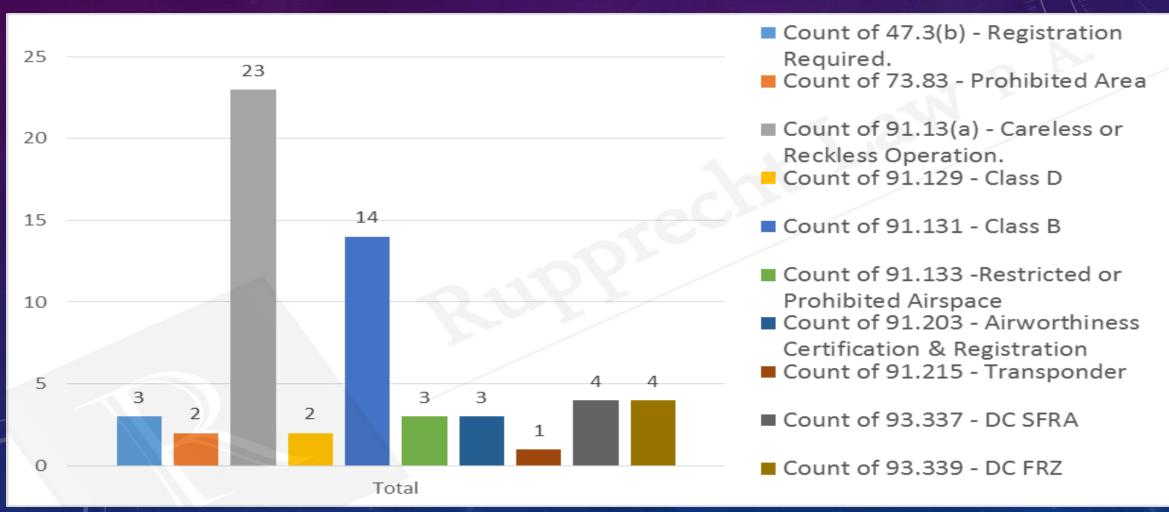
- The FAA may assess civil penalties up to \$27,500 for failure to register a drone.
 Criminal penalties include fines of up to \$250,000 and/or imprisonment for up to three years.
- Fines for flying drones in a national park can exceed \$1,000
- \$20,000 penalty for interference with fire suppression, law enforcement or emergency response efforts
- \$10,000 fine placed against Ralph Pirker for flying recklessly over UVA Medical School
- \$1.9 million dollar civil penalty against SkyPan International for multiple violations is still pending
- Flying a drone in a reckless manner is a violation of Federal law and FAA regulations and could result in civil fines or criminal action. If you see something that could endanger other aircraft or people on the ground, call local law enforcement.

RECENT ACTIONS

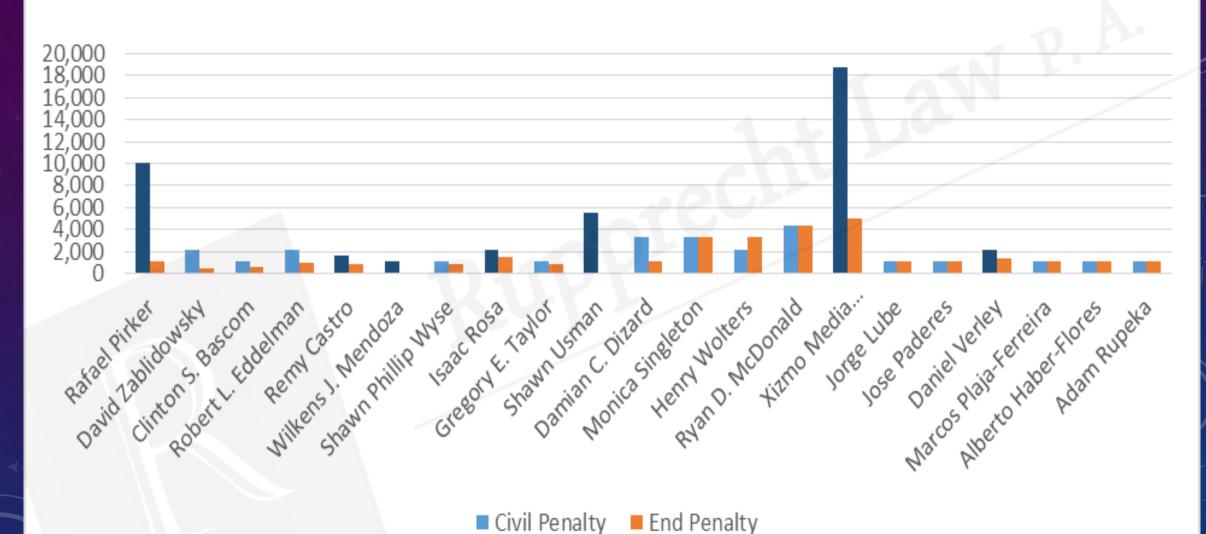
- Two companies were targeted
- Defendants received reduced penalties when an attorney was involved
- No one had a 333 exemption in effect at the time of the flights
- Two certificated pilots were targeted
- 1 case started with a subpoena
- 151 days is the average from the date of the first violation to a notice from the FAA
- Phantoms were the most used aircraft
- Many of the flights occurred in Class B Airspace
- 4 of the flights were commercial
- 5 of the flights included mention of "loss of line of sight" in the facts justifying a violation of the prohibition on careless and reckless flying
- 9 of the cases also had some type of arrest or fine under state or local law for the flight
- The FAA did NOT charge the defendants with all the regulations that were possible

TWENTY THREE DRONE OPERATOR PROSECUTIONS BY THE FAA — WHAT EVERY RECREATIONAL AND COMMERCIAL DRONE OPERATOR NEEDS TO KNOW.

BY JONATHAN RUPPRECHT



Penalty Before & After Attorney Negotiations



ENFORCEMENT

- The first line of defense against enforcement problems will be compliance with the rules
- See something; say something
- Local law enforcement
- Professional Ethics

INSURANCE

- The FAA says nothing about insurance but I bet your boss will.
- Only a few carriers specializing in drone coverage
- \$1 million of liability runs approximately \$2,500 annually
- Better rates and deductibles for hull coverage of higher quality equipment
- Additional premium charge for personal injury
- Failure to register your drone may invalidate your policy
- Homeowners insurance not likely to cover your drone (even in your own backyard)
- Operations with manuals, maintenance logs, proof of training are preferred by providers
- Different project types / different liabilities (agriculture mapping vs utility inspection)

EXPOSURES

- Bodily Injury and Property Damage
- Products/Completed Operations Liability
- Non-Owned Use of UAS
- Consequential Losses
- Catastrophic Loss Potential
- Personal Injury/ Privacy
- Cyber

RISK

- High Frequency/Low Severity
 - Most of the claims will fall under this category
 - UAS strikes building breaking a window
 - UAS strikes third party causing minor injuries
- Low Frequency/High Severity
 - Greatest area of concern
 - What is the large catastrophic loss?
 - Based on previous manned aircraft claims, \$5-\$7M per person is a guideline when discussing aviation related fatalities.
 - Does that apply in the UAS space?
 - (\$1-2 million is currently pretty standard)

TYPES OF INSURANCE

- General Liability
- Pays what the insured becomes legally obligated to pay because of bodily injury or property damage that occurs during the policy period, caused by an occurrence in the coverage territory arising out of the ownership, maintenance, or use of a scheduled aircraft.
 - Covers bodily injury and property damage (third party) including resulting loss of use
 - Coverage territory: Does the policy limit your coverage territory?
 - How do you handle the scheduling fleet aircraft? On liability only policies, blanket owned UAS language is becoming more common.

TYPES OF INSURANCE

Hull and Liability Policy

- Pays for the direct, physical, and accidental loss of or damage to the scheduled aircraft sustained anywhere in the coverage territory.
 - Insurer owes the lesser of repairs verse scheduled value
 - Physical Damage coverage does not include loss of use.
 - Coverage will typically have a 5% or 10% deductible; deductible applies to valuation, not the loss
 - Payloads and ground equipment typically get scheduled separately by endorsement
 - (payload is usually more valuable than the drone)

TYPES OF INSURANCE

Non-owned Aircraft Liability

- Protect Insured for legal liability arising out of use of non-owned aircraft
- Example: Engineering firm sub-contracts work to UAS operator for services. A Non-owned policy would protect Engineering firm in the event they are held legally liable and not protected under subcontractors policy.
- You can also transfer risk contractually, but not if you are the operator

THIRD PARTY DRONE USAGE

Be aware of any sub-consultants that *may be* utilizing drones as you could be vicariously liable for any claims that arise. Be sure to check the sub-consultant's coverage amounts and obtain certificates of insurance proving coverage.

If the sub's insurance is inadequate, touch base with your agent to make sure your firm is adequately covered in the event a drone claim arises and you're pulled into the dispute.

WHAT SHOULD I THINK ABOUT WHEN HIRING A UAS SURVEY?

- Site conditions (vegetation problems, people, road ROW)
- Site access
- Product deliverables...photos, video, mapping,
- Insurance
- Liability
- Deliverables (get everything they produce even if you don't know what to do with it)

WHAT WILL THE CONSULTANT NEED TO DO ON SITE?

- Set up somewhere on your property (not always)
- Define the area to be flown using satellite imagery (Google Earth)
- Place targets or use photo identifiable control locations
- Survey the control points
- Fly the area of interest (still and or video)
- Confirm the project area has been imaged

WHAT WILL THE CONSULTANT NEED TO OFF SITE?

- Upload imagery to the cloud or process it on a laptop or office computer
- Measure the control points within the imagery
- Generate a surface model of the terrain
- Generate an orthophoto image
- Generate contours
- Produce topographic mapping
- Generate volumetric analysis / reporting

HIRING A DRONE SERVICE PROVIDER?

- Licensed?
- Insured?
- Obtain and check their certificate of insurance for coverage
- Request to be named additional insured
- Request a waiver of subrogation
- Request a primary non-contributory (sub pays first)
- Request that the UAS company indemnify you against any action, suits, damages, losses, costs and expenses (including, without limitation, attorneys' fees and costs) arising from the UAS operation or the use of the related UAS images



Thank you!

Greg Lemke CP, Air Land Surveys