DECEMBER TEAM SCRIPT

12/12/16

Title: "LIVE from Chima, It's a bird! It's a plane! It's a drone?!"

Characters/Roles:

1. Host – **COLIN SALTRY**
2. Sidekick – **MITCHELL KLEVAN**
3. Game 1 **– JUDGE HILL, TAMI WIBLE, JOHN GAGLIANO**
4. Scorekeeper for Game 1 – **JUDGE NEIFIELD**
5. Tech / Siri – **JACQUI CAMPBELL**
6. Johnny From Philly – **JOHN POWELL**
7. Air Traffic Control – **JOHN GAGLIANO**
8. Rudolph the Red-Nosed Reindeer – **FELIX YELIN**
9. Nicky from South Philly – **NICK PINTO**
10. Commercial Spot #2 Voiceover - **JOHN GAGLIANO**
11. Discussion Leaders - **JUDGE NEIFELD, ED CHACKER, JOHN GAGLIANO, JUDGE HAYDEN**

Props:

1. Reindeer antlers and nose (**Felix**)
2. Drone (**Jacqui**)
3. ATC headset/outfit (**John G.**)
4. 2 bottles champagne (and cups) as prize for the games (**John O'Neill**)
5. ** Song sheets with lyrics to "There's No Place Like Home for the Holidays" to be handed out to audience members (**Rachel or Colin**) – HOW MANY COPIES DO WE NEED??
6. **Question and multiple choice answer sheets for the first game (multiple choice madness) to hand out to audience/teams (**Rache**l)
   Make sure song lyric sheets and question/answer sheets are given out at the check in table…..

INTRODUCTION

MITCH: Good evening and welcome. We have a great show for you tonight about drones. But first, let's see how much you already know about drones.

GAME NO. 1: MULTIPLE CHOICE MADNESS

TAMI: Hey, everyone, welcome to the show!! Before we get into it, we're going to have a little fun with a trivia game. We have 6 questions for you. Each table is a team, and you should have a question sheet. Quickly designate one person at your table to record the answer on your team's sheet. We will tally up the scores at the end. And there is a prize!!

JUDGE HILL: Ok, let's get started!

**** read question and the answer choices – each team records its answer on the question sheet.*

1) **[Judge Hill:] How much airspace do you own above your property?**

   a. Not an inch above your roof

   b. 80-500 feet

      i. SOURCE:http://www.slate.com/articles/news_and_politics/explainer/2013/07/photographer_george_steinmetz_arrest_how_much_airspace_do_you_own.html

      ii. "While the Supreme Court **hasn't explicitly accepted** that as the upper limit of property ownership, it's a useful guideline in trespass cases. Therefore, unless you own some very tall buildings, your private airspace probably ends somewhere between 80 and 500 feet above the ground. Paragliders and hang gliders can easily **soar above that height**, so your ability to exclude a snooping gliding enthusiast appears to be limited. (It should be noted that the vast majority of **complaints** about trespassing hang gliders result from their landing on, not flying over, private property.) The upward boundaries of private property may be changing. The federal government is considering lowering the floor of navigable airspace below 500 feet to accommodate surveillance drones, which sometimes travel at lower altitudes.

   c. 2,000 feet

   d. unlimited amount of space

2) **[Tami:] How close can you fly a drone to an airport without getting special permission?**

   a. 1 mile

   b. 2 miles

   c. 5 miles

      i. https://www.faa.gov/uas/where_to_fly/airspace_restrictions/

      ii. "Recreational operators are required to give notice for flights within five miles of an airport to BOTH the airport operator and air traffic control tower, if the airport has a tower. However, recreational operations are not permitted in Class B airspace around most major airports without specific air traffic permission and coordination."

   d. You can use the runway to land your drone

3) **[Judge Hill:] True or False: Only the federal government has authority to set drone regulations?**

   a. **FALSE:** http://dronelife.com/2016/03/04/state-drone-laws-how-many-actually-pass-and-why-does-it-matter/

      i. The National Congress of State Legislators (NCSL) says that 45 states considered 168 pieces of drone legislation in 2015. During the 2016 legislative session, at least 35 states have considered drone laws. But of the 45 states that talked about, discussed, reviewed, argued and (sometimes) voted on drone laws in 2015, only 20 states actually passed 26 pieces of drone legislation, and 5 states "adopted resolutions," which means that the states agreed to form a committee to think about them. The overwhelming majority of state drone laws fall into three categories: protecting the privacy of individuals, prohibiting drone use for hunting, and limiting drone use by law enforcement. Other laws create drone commissions, restrict the use of drones in certain industries, or address common sense misuse such as flying over prisons or fireworks displays – often in laws redundant to existing federal guidelines.

4) **[Tami:] As of June 2016, how many hobbyist drones have been registered with the FAA?**

   a. Over 1 million

   b. Over 400,000

i. http://www.forbes.com/sites/johngoglia/2016/06/15/over-450000-hobby-flyers-have-registered-so-why-does-fighting-faas-drone-registry-still-matter/#3417bf076c85

ii. But now, more than six months later, the FAA's latest registry count has 468,214 hobbyist owners registered. The FAA doesn't have data on how many hobby owners are actually out there so it can't say what the compliance rate is. But we do know that the number of hobby drones this represents far exceeds the approximately 300,000 manned aircraft on the FAA's aircraft registry, keeping in mind that the FAA requires owners to register once regardless of the number of drones owned. (Manned aircraft and commercial drones have to be individually registered.).

c. Over 100,000

d. Over 50,000

5) **Judge Hill: Drones weighing over how many pounds need to be registered with the FAA?**

a. No registration required

b. All drones need to be registered

c. 5.3 lbs or heavier?

d. 0.55 pounds or heavier

i. If it weighs more than 250 grams (0.55 pounds). No registration is required for drones weighing less than 250 grams. Explanation: Even though operator licensure is not required for recreational operation, all drones between 0.55 and 55 pounds must be registered on https://registermyuas.faa.gov/.

6) **Tami: Who can currently fly a drone for commercial purposes?**

a. Anybody in the world

b. Anyone who is over the age of 14

c. Anyone who has an FAA sUAS commercial operator's license.

i. Explanation: The commercial use of drones in the US is subject to recently-published regulations contained in 14 C.F.R. Part 107 (effective June 28, 2016). In short, licensed pilots who have a current FAA medical certificate and flight review can pass an online training course to receive their UAS commercial license. All non-pilots have to pass a more extensive test given at an FAA-approved exam facility that covers drone regulations, aircraft regulations, airspace regulations, best practices, operating limitations, and required inspections. See 14 C.F.R. Part 107, Subpart C, Pilot Certification

d. Only Ed Chacker.

Review each question and the correct answer with some (abbreviated) information about the correct answer. Ask which team got all 6 answers correct; 5 correct answers; 4, 3, 2, 1 – figure out top 2 scoring teams – award prizes

SHOW INTRODUCTION

[cue music]: https://www.youtube.com/watch?v=SyrhVoK1QKs

MITCH: Live! From Chima Brazilian Steakhouse, the December Team is proud to present: It's a bird! It's a plane! It's a…drone?!

[tech person flashes "Applause" power point slide]

Tonight's guests: Rudolph the Red Nosed Reindeer, Johnny from 2 street, 2016 winner of That Drone Challenge on The Drone Show…Nicky from South Philly. And we have a special musical performance.

I'm Mitchell Klevan. And now, here's your host. Colin…Saltrrrrrrrrrrrrrrry!

COLIN: Thank you, thank you. Good evening everybody. What a great looking crowd! How's everyone doing tonight?

You know, before the show a bunch of you kept coming up to me with questions about tonight's show? And it was really just the same two questions over and over again. So, the answer to the first question is yes, tonight's show is entirely about drones and drone law. And to answer the second question no, you can't have your money back.

Just kidding, we're going to have a great time. There's so much to talk about with drones. In fact, Consumer reports just published an article detailing some of the ways drones are changing our world, including in insurance, wildlife conservation, and the in delivering humanitarian aid. My neighbor Fred wasn't interested in any of that, though. He just wanted to know if I could move my dresser to the other side of my bedroom.

Drones have been in the news a lot recently. A Washington, D.C. man who crashed a drone near the White House earlier this year was cited for a second time for flying his drone in the city limits. The first time he was caught, the man said the crash landing was an accident. But this time around he said it was a public service. Yes, that's right… he said he wanted to get a picture of the White House before Donald Trump covered it in gold leaf.

MITCH: That's true, the White House has seen a lot of action with drones recently. Last January, an off duty federal employee had a few beers and decided to fly his drone out his apartment window. Wouldn't you know it, he lost control of the drone and crashed it into onto the White House lawn. When the Secret Service came by

to ask what happened, the now-former federal employee said "hey, the drone was drinking not me, baby!"

COLIN: In fact, apparently after the drone went AWOL, the guy texted a bunch of his friends saying "hey I think my drone crashed into the White House." One of his friends, who hadn't been drinking but was enjoying a different…uh…pastime texted him back [stoner voice] "but what if – actually - the White House crashed into your drone, man."

MITCH: Here we go just in time for the holidays. TGI Friday's much-hyped "mobile Mistletoe" drones drew first blood in their New York City debut when one of them hit a patron right in the face. Fortunately, the woman involved in the drone strike is fine, though she has suffered some cuts and bruising on her face. A spokesperson for the woman said that while the cuts on her face will heal, the emotional trauma of TGI Friday's $5 appetizer experience will linger forever.

COLIN: Have you seen this, have you heard about this? A man who was arrested for flying his drone outside an upstate New York hospital has opened up to tell his side of the story. Yes, apparently when patients spotted his drone flying outside their windows, they feared they were being spied on and called the police. After his arrest the man said "I am definitely NOT a Peeping Tom…my name is David and I'm a human being."

MITCH: Haha, that is priceless.

Drones really are changing our world in some unexpected ways. Online retail giant Amazon is reportedly considering using drones for express delivery in certain cities. The company says that in addition to benefiting the environment, Amazon's drone fleet will help bolster consumer confidence. Yes, the company says that its drone tracking technology will give you real time updates on your packages' delivery status as well as video evidence of which of your neighbors stole your package from your stoop!!

COLIN: [SLOW DOWN FOR EMPHASIS] How about this one? Two people were arrested for trying to use a drone to smuggle drugs, tobacco, and pornography into a maximum-security prison. Police say the drone in question had a cargo capacity of 6 to 8 ounces and described the attempt as "very, very troubling." One smuggler who was used to smuggling contraband into the prison the "traditional way" agreed that he could not compete with such technology, saying "hey man, I need this job but 6 to 8 ounces is a lot to swallow."

COLIN: We've got a great show lined up for you tonight. Rudolph the Red Nosed Reindeer is here!

[**applause**]

Please give it up for Nicky from South Philly, 2016 winner of 'That Drone Challenge' he's on the program as well.

[**applause]**

We will have a lively discussion and a slew of other surprises, so stay tuned for a great show, no flipping we'll be right back after this brief commercial break.

[**applause]**

COMMERCIAL BREAK #1

Modern Family Drone Episode excerpt about the drone [insert correct link here]

[**Cue Music & Set up for Desk Segment**.] https://www.youtube.com/watch?v=fZ_fYVcsRh8

DESK SEGMENT & CALL SKIT

COLIN: Okay and we're back! Mitchell and I would like to thank everyone for tuning in tonight.

MITCH: Yes, we couldn't have "drone" this without you. HA HA HA!

COLIN: Isn't he the greatest, folks? [**applause**] It's almost as if he believes it. [light laughter]

COLIN: We've got such a great show for you tonight. As we said, tonight we're talking about everyone's favorite gift…. Drones!!

MITCH: Wow, sounds like a real barn burner.

COLIN: Come on, now. It could be worse, we could be talking about the Kardashians.

MITCH: I guess you're right. It is the holiday season and all people should know what they're getting themselves into.

COLIN: Right, you know my roommate is thinking about getting a drone.

MITCH: Yeah?

COLIN: Yes, as if the 3:00 am drum practice isn't enough….

MITCH: Hey, speaking of drones, I heard JOHNNY from Two Street just got a drone. Look out Philly!!

COLIN: Oh boy, we're in trouble. What's he going to do with a drone?

MITCH: Yea, he was going to fly it over his Aunt's house in Essington to take photos or somethin'

COLIN: Near the airport?

MITCH: I guess if he stays over the house it's legal?

COLIN: You know, let's see if we can get him in here.

JOHNNY, are you there? Why don't you come on out here

[**ENTER: Johnny**]

Everybody, please welcome to the show, Johnny!

JOHNNY: [yelling at iphone] Siri! Can I fly… Oh hey guys how ya doin'?

COLIN: Great, you're live on the show. We heard you just got a drone?

JOHNNY: I'm fusstrated because I can't figger out how to get permission to fly by the airport. Jimmy says I'll get arrested if I fly the drone by the airport. So I was tryin' to ask Siri when youse called.

COLIN: Well, don't let us stop you – see if Siri can help

JOHNNY: Siri? Can I fly a drone at the airport?

Siri: Why don't you call the airport?

JOHNNY: Oh, Siri's bein' a wise guy, eh? Mitchell, – how about callin' the airport?

MITCH: [**Dials Airport, changes voices**]: Yes, we need to speak to someone about drones. Yea, flyin' drones from a winda in Sow Philly. Oh, air traffic control tower? Okay.

JOHNNY, they're sendin me to air traffic control tower.

JOHNNY: Okay, put it on speaker phone and can you get us some wooders? It's hot

ATC: Air Traffic Control (https://youtu.be/LnIIkL4AJNc)

JOHNNY: Yo, I want to fly my drone down in Essington, can I do dat?

ATC: Sir, what type of drone

JOHNNY: Black and green

ATC: No sir, what type of drone, meaning is it recreational or commercial?

JOHNNY: I'm flyin out the winda from my house.

ATC: Sir, FAA regulations prohibit you from flying a drone within five miles of the airport

JOHNNY: So….is that a no?

ATC: [**annoyed**] Yes, sir, that's a no.

JOHNNY: So your sayin' I problee coont fly my drone down to my aunt's house in Essington?

ATC: Not probably - Sir, you cannot fly your drone in that air space.

JOHNNY: Man, youse are really gone ruin my aunt's Christmas present. I was plannin' on givin' her a pitcher of her house for Christmas. This is redicless.

ATC: Sir, anything else I can help you with?

JOHNNY: Can I fly my drone here?

ATC: [**annoyed**] Sir, where is HERE?

JOHNNY: 2nd and Mifflin

ATC: Yes, that is more than 5 miles from the airport.

JOHNNY: Really, nooice!

ATC: But you cannot fly the drone higher than 400 feet, it must always be in sight, and you must be at least 5 miles from the airport and cannot fly directly over crowds.

JOHNNY: Alrighty. No sweat, man. Don't get your knickers in a bunch or anything [look at crowd and wink, pointing at the phone]

ATC: Sir, if you do not comply with those rules, then there are significant fines.

JOHNNY: [**hangs up**] Didja hear dat? We can fly the drone right here at 2nd and Mifflin! Can ya believe it? I'm gonna get tha whole two street parade!

COLIN: JOHNNY, I think he said that you have to stay away from crowds, buddy.

JOHNNY: Well, that's only if I get caught [**smile/wink to crowd**]. This drone's not registered so there'd be no way for them to find me. Haha, jokes on them.

COLIN: Ha ha ha, yes indeed. Give it up for Johnny, ladies and gentleman!! We'll be right back with our first guest, your favorite reindeer…. Rudolph! No flipping!

COMMERCIAL SPOT #2: IDIOTS WITH DRONES

https://www.youtube.com/watch?v=-rq7KGwz7e8

Interview #1: Rudolph the Red-Nosed Reindeer

COLIN: Our first guest tonight is an international superstar. He's the president of the Reindeer Transportation Workers Union and he's here all the way from the North Pole. Please give a warm Temple Inn of Court welcome to Rudolph the Red Nosed Reindeer!

[**Applause**]

[**Cue Rudolph's intro music**]: https://youtu.be/1RpULOHtiVw?t=40s

COLIN: Welcome to the show, Rudolph! Boy, it's been a while…

Rudolph: Well, if you were on the NICE list more often, I might see you at least once a year…..

COLIN : [**Laughing**] Yea, well I can't make any promises this year… But seriously, we asked you here tonight because we understand that your union of gift package delivering reindeer in the North Pole has gone on strike???? Say it ain't so, Rudy!!

Rudolph: That's right, COLIN! I represent the Reindeer Transportation Workers Union Local 001, and we got a grievance with the Big Guy up there in the North Pole. See, he wants to outsource all package delivery this holiday season to Amazon 'cause they're using DRONES to deliver packages….

COLIN: Sounds like a great idea to me…. I never understood how you guys got all your deliveries done in a single night anyway! I hear that's what may happen at the big express delivery outfits like UPS and Fed Ex too. What's wrong with the drones??

Rudolph: [**Looking aghast**] Hey, do you want anything on your wish list this year, buddy?? This whole drone thing has gotten out of hand! We delivered a 100 of 'em last year and now they're taking over the world and forcing us honest, hard-working reindeer out of a job!! I can't start doing something different now at my age! I already got competition from Garmin and Siri with the directions…. Who needs a red-nosed reindeer with a GPS sense of direction? Now, my sleigh-transport job might go away too!!

COLIN: Ok, Ok, I get it – settle down now…. I'm sure it's not as dire as you're thinking. I mean, not every kid can just operate a drone without some supervision – I'm sure there are rules about that. And as for Amazon, Fed Ex and UPS…. I have a hard time thinking that they will take over ALL package delivery with those things. I mean, can you imagine it?? The skies will be full of low-flying objects!!

Rudolph: Santa claims he isn't getting any younger, or thinner, and going down all those chimneys has taken a toll….. but we reindeer have families to feed! The robots are already threatening to take over the elves' job on the toy assembly line, and now we got competition from drones!!

COLIN: Those drones must be pretty small…[sinister] and silent.

Rudolph: Exactly – and once they're inside, who knows what they can do. I wouldn't be surprised if Santa doesn't deposit a micro-camera in the house to be sure those kids are REALLY nice all year long….. Everyone knows drones are used by the government in many ways to combat the bad guys, so why shouldn't SANTA use it to make sure he keeps his naughty and nice list up to date?? What is this world coming to??

COLIN: Well, Rudy…that's a shame. Onwards and upwards, good luck and success in the future. Okay, we're going to take a quick commercial break and open this up for discussion.

We'll be back shortly with Nicky from South Philly so stick around!

****

FIRST BREAK – QUESTIONS FOR THE AUDIENCE – Judge Neifield, Ed Chacker, John Gagliano – build off what happened so far… and/or use these starters:

1. What do you see drones doing in the future?

2. What do you think about drones taking over the skies with little or no regulation?

3. Drones – like robots- could replace certain jobs displacing more workers – leading to labor unrest or a glut of unemployed workers – any thoughts on that?

4. Movies like "Eye in the Sky" and shows like Homeland have shown how drones have expanded the war on terrorism, used effectively in defense and military operations. They can be small and nearly impossible to detect – which raises the concern of their being sent/place in homes or other private settings. Their uses could invade the legal sphere, with attorneys using them to film plaintiffs or defendants, to obtain discovery in new and unimaginable ways. Is anyone bothered by the assault to personal privacy that drones could present? [**BACK TO THE SHOW!!**!]

Interview #2: Nicky from South Philly

[**cue music for next interview**]: https://youtu.be/I_OtHrzjkLI?t=7s

COLIN: Welcome back to the show, everybody! Next up we have Nicky from 16th and Passyunk, 2016 winner of the "That Drone Challenge" on The Drone Show. Come on out here, Nicky!

[**cue Nicky's entrance music**]: https://youtu.be/ZdFW3_q7v4A?t=16s

Welcome, Nicky!

Nicky: Thanks, Colin, it's good to be free.

COLINt: Free?

Nicky: Yea, I did 30 days in the joint for drinking and droning…allegedly.

COLIN: Drinking and droning? Is that even a crime?

Nicky: No way, right? Who knew???!

Let me tell you what happened.

It started out like a regular snow day in the neighborhood.

I was home… out for a while on disability from my City job… so I spent most of the morning shoveling…. [**CUE UP ON SLIDES A PICTURE OF A SAVED, SHOVELED PARKING SPOT LIKE THIS: http://d279m997dpfwgl.cloudfront.net/wp/2015/02/0218_space-saver_cog.jpg**

First, I shoveled my payment and my Aunt Carmela's payment, she lives next door.

Then I shoveled out a parking space for my girlfriend Connie's SUV. A primo corner spot. You just pull right in. After I put a chair in the parking spot, I went to the corner bar, Johnny D's, had a few sambuca's and coffee to warm up, and then I went home to make dinner. I'm home a lot now… got a lotta time on my hands… and I learned how to cook and fly drones.

As I was walkin' back to my house, I get into it with some wise guy tryin' to take my parking spot. He knew better than to mess with me and drove off.

COLIN: So, what did you do next?

Nicky: Well, I was gonna be busy makin' gravy for dinner because Connie won't eat nothin' but fresh made…, so I got my drone out , the one with the camera that's hooked up to my computer and hovered it over the parking spot. I needed to make sure no one parked in our spot while I was makin' gravy.

I had it up near my second floor winda so I could see my spot, my cousin Vinny's spot and my neighbor Little Nicky's spot (lotta Nicky's in my neighborhood). They paid me real good money to watch over their spots.

COLIN: Wow, they paid you to watch a parking spot?

Nicky: Parking spots are like gold in South Philly and after a snow storm…it gets crazy. Usin' the drone made it easy… I use to have to pay kids to help me watch. Mothers didn't like it, said it was dangerous work for some unknown reason [**look at crowd and hunch shoulders….].**

COLIN: How did you get arrested if you were just watching parking spots?

Nicky: Well , Janice from across the street, who I had a thing with years ago, saw the drone and thought I was recording her in her bedroom. So, she takes a shotgun and shoots down my drone! Can you believe her? I mean, who in their right mind would take photos of her? Believe me … she's no playboy model….she sits inside eating cannolis and watching TV all day…. Maury Povich "You are the father!"

COLIN: A shotgun? In South Philly? Did anyone get hurt?

Nicky: Yea, my drone was shot to shit! Next thing I know the cops show up and Janice is outside claiming that I was recording her in her bedroom and that I was a stalker who was obsessed with her. I was not recording her… at least that's what I was tryin' to tell the cops when one of 'em asked if I'd been drinkin'. I said I had some sambuca and coffee and then took a Xanny (prescribed) for the anxiety I had over watchin' over the parking spots.

Next thing I know, I'm in the back of the cop car on the way to the hospital where they gave me a blood test. They took me in for [**USE AIR QUOTES**] "operating an aircraft within 8 hours after consuming an alcoholic beverage." Can you believe that? I was flying a freakin' drone and they're actin' like I was flying a plane down Broad Street! It's not like I didn't know what I was doing – I was the winner of the Drone Challenge for Chrissakes!

After that, my gravy was ruined, my drone was murdered, and Janice – who didn't even shovel HER sidewalk – gets nothin'!! How do ya like that?? She shoots down MY drone and nothin' happens (gesturing). And…. I know it's because her husband's cousin's wife is a detective. That's the real crime here. It's a cover up!

COLIN: Well, hold on. Doesn't Janice have a right to privacy in her home? Doesn't she have the right to be free from drones videotaping her in her bedroom?

Nicky: I wasn't videotaping her!! Whose side are youse on, buddy?? As I explained, I was watching the parking spots on the street. I couldn't care less what she does in her bedroom. Plus, my drone was in the street – she don't own the street.

MITCH: Colin, we have a caller on the line, says her name is Janice Galzarano.

Nicky: That's the woman who murdered my drone!

COLIN: And we're gonna take a quick break. Stay tuned, we'll be right back!

[**cue video leading into commercial**]: https://www.youtube.com/watch?v=d-wnDCJ3rgU

Commercial Spot #3: Advising your client on drone law:

JOHN GAGLIAO [commercial voice over]:

Drone law has exploded onto the scene ever since Amazon decided it could do a better job than Rudolph and his friends in the North Pole. If you're looking to expand your legal practice into this exciting area of the law, now is the time!

But, BEWARE of the some common pitfalls before engaging in any new practice of law. As you know, rule 1.1 of the Rules Professional Conduct provides that "A lawyer shall provide competent representation to a client. Competent representation requires the legal knowledge, skill, thoroughness and preparation reasonably necessary for the representation."

DON'T DRONE ALONE! Get educated and learn the ins, outs, highs and lows of navigating drone law. Brush up on your FAA regulations, and get excited to soar to new heights as you learn about commercial vs recreational operation of a drone as well as privacy concerns, insurance liability and so much more! You won't be *remotely* disappointed.

DISCUSSION/BREAK: JUDGE HAYDEN, ED CHACKER

COLIN: Alright and welcome back to the show. Next up on the program tonight we're going to take ask our wonderful audience some questions!! Here to lead the discussion are our friends, Judge Hayden and Ed Chacker.

Judge Hayden and Ed Chacker ask questions about the prior vignettes, and where people think drone use is heading in the future. Also will discuss recent news of Dumb Things People Do With Drones:

PICK A FEW EXAMPLES FROM THE FOLLOWING LIST TO DISCUSS

- - **Near Crashes with manned aircrafts**
    - **Drone strike: Inquirer recently reported about a Drexel University student who flew his drone 1500 feet above apartment and nearly crashed into a police helicopter. A news camera from another helicopter caught the entire event on film.**
    - Of all the incidents listed in the FAA report, just one involved a drone striking a person. In October, a small drone flying low over the Daytona Beach Municipal Stadium struck "a citizen causing (a) minor abrasion."
    - From Aug. 22, 2015 through Jan. 31, 2016, nearly 600 drones flew too close for comfort to airports and airplanes
- **Crashing Drones**
    - **Grounded:** In August, a pilot was arrested after getting stuck in a tree at Freedom Plaza in Washington, DC after climbing up to retrieve a crashed drone.
    - **Crash in White House (or other restricted areas)** http://www.nytimes.com/2015/01/28/us/white-house-drone.html?_r=0

-**Flying near sporting events**

- There were more than a half-dozen incidents of people flying drones near crowded sporting events.

-Striking a person

- **Drone strike:** Of all the incidents listed in the FAA report, just one involved a drone striking a person. In October, a small drone flying low over the Daytona Beach Municipal Stadium struck "a citizen causing (a) minor abrasion."

- **Knocking people down.** In April 2014, a triathlon athlete in Western Australia was knocked down by a drone and suffered a head injury, according to **ABC News**. The woman told ABC that the drone caused a "number of head injuries and required three stiches."

- Bard College research group on drone incidents said that from December 2013 through September 2015, there were 28 incidents involving airplane pilots taking evasive action to avoid a drone while flying.

- **Flying too high/low**

  - **High altitude:** There are at least 18 incidents involving drones flying above 4,000 feet, with some as high as 15,000 feet. (Most of the drones available to the general public fall into the FAA's Model Aircraft category, which means they're supposed to stay under 400 feet.) In a report from last May, a pilot approaching LaGuardia Airport reported seeing a 10- to 15-foot-wide drone at 5,500 feet above the southern tip of Manhattan.

- **Conducting Illegal Activity**

  - **Using drones as flying drug mules. Amazon's proposed Prime Air System** aims to deliver packages using drones, but apparently drug cartels are also toying with the idea. Earlier this year, a drone carrying a 6-pound cargo of crystal meth crashed into a supermarket parking lot in Tijuana, **according to CNN**.

- **Using them to fly yourself.**

Other ways Drones are Changing the World:

- **Agriculture**

  - **"**In recent years, farmers have discovered that drones are very useful for monitoring the health of their fields. "It would cost me a couple hundred dollars an hour for a plane or helicopter," says fourth-generation grain and apple farmer Jeff VanderWerff. "With my [DJI] Phantom 3 drone, a device I paid $1,200 for, I can fly it every day."

- **Photos and Videos**

  - "The soaring panoramas captured by drones are compelling enough to have made their way into movies such as "Captain America: Civil War," "Spectre," and "The Wolf of Wall Street," as well as CNN's coverage of the earthquakes in Italy and Ecuador a year ago. Real estate agents and travel hot spots are embracing the technology, too, to promote their scenic offerings. And now that drones can be programmed to follow their owners, they're even more likely to turn up in the air above cyclists, skiers, surfers, hikers, and kayakers. **Bottom line.** Images from drones are appearing right now on TV, movie screens, YouTube, and Instagram feeds."

- **Humanitarian Aid**

  - Some 1.3 billion to 2.1 billion people on the planet don't have access to essential medicines, the World Health Organization says, often because they live in hard-to-reach places. To address that concern, one drone maker signed a deal with the government of Rwanda last February to shuttle supplies to remote areas on demand. Last August, the Obama administration announced that it would partner with private-sector firms to begin testing the idea on Maryland's Smith Island, Washington's San Juan Islands, and Nevada's Pyramid Lake Tribal Health Clinic."

- **First Responders**

  - Better yet, aerial footage provided by drones keeps early responders out of harm's way. In a SWAT scenario, for example, a camera-equipped craft with a powerful 30x zoom lens can give officers a close-up look at a compound where hostages are being held—while they remain 1,000 feet away. And, likewise, a fireman can fly a drone with thermal-imaging and video-streaming capability over a four-alarm blaze and determine, in real time, where to direct his colleagues and where to help them avoid trouble.
  - Of course, drones with zoom lenses also raise the specter of unwanted surveillance. In a 2012 Monmouth University telephone poll, fewer than one in four Americans endorsed the idea of having the aircraft patrol the nation's highways, doling out speeding tickets. That's why the Michigan State Police have taken a cautious approach, even meeting with the American Civil Liberties Union to review policies, says Sgt. Matt Rogers, a member of the force's aviation unit. "The last thing I want to do is create case law," he says. "If using a drone furthers an investigation, we require a search warrant."
  - **Bottom line.** Drones will become a vital tool for police officers and firefighters in the next five to 10 years.

- **Safety Inspections**

  - With a waiver to the flight rules that prevent drones from flying beyond the pilot's view, the technology could one day be deployed to spot-check roads, bridges, pipelines, dams, and other public works. That could allow for better use of limited tax dollars. "Even with the same amount of funding, with better information workers can be deployed to the places where they're most needed," says Thomas Haun of PrecisionHawk, which offers drones and data services to energy companies, utilities, and construction firms. In the U.S., a country with a D+ infrastructure rating (according to the American Society of Civil Engineers), that's no small thing.

- **Insurance**

  - "With that in mind, most of the major insurance companies are now experimenting with drones, some by hiring outside contractors, others by sending out aircraft of their own. If you're a claims adjuster, it saves you time and money, and reduces the risks of climbing ladders and walking on damaged roofs. But if you're the customer, that might not translate to lower insurance premiums. "I doubt the savings will be passed on to consumers," says Skylogic Research's Snow. But those reductions in inspection time

could lead to quicker settlements, and the detailed documentation in the aerial photos feasibly could aid with disputed claims. **Bottom line.** This application could be widespread very soon."

- **Hurricane and Tornado Forecasting**

  - "In the future, when a severe tropical storm approaches Florida, as Hurricane Matthew did last October, autonomous aircraft developed by defense contractor Raytheon Missile Systems could fly right up to the maelstrom to take measurements for the National Oceanic and Atmospheric Administration (NOAA)."

- **Wildlife Conservation**

  - **"**In recent years, scientists at the Woods Hole Oceanographic Institution in Massachusetts have used drones to monitor the health of humpback whales off the coast of Cape Cod, even capturing from their blowholes breath samples flush with DNA that can be analyzed for wildlife studies. But to date, the tech's most profound contribution to wildlife protection might be unfolding in Africa, where drones are policing vast tracts of land to catch poachers hunting rhinos and elephants. The horns and tusks of those animals can fetch hundreds of thousands of dollars from Asian crime syndicates."

CLOSING & MUSICAL PERFORMANCE

MITCH: Well?

COLIN: I think that about wraps her up. I want to thank everyone….

MITCH: Hey, wait a minute!! Aren't you supposed to do a song?

COLIN: What? I didn't really prepare something…. .

MITCH: Yes, we were promised a musical performance!

COLIN: Well…. If you insist….

[**cue music to There's No Place Like Home for the Holidays**]

Colin leads group in sing along with new drone lyrics.

[**ALL TEAM MEMBERS**:] Oh, there's no gift like a drone for the holidays
'Cause no matter how far away it's flown
You will find it's embarrassed you in a million ways
For the holidays you sure can't beat a drone

[**COLIN ONLY**:] I met a man who lives in old D.C.,
And he was headin' for
County jail, for crashing his drone into the White House.
Then there's drone-ers watching sunbathers
Relaxing on their roofs

So to the dad who used a shotgun
Man, you'll never be forgotten.

[**ALL TEAM MEMBERS AND INN MEMBERS**:]
Oh, there's no gift like a drone for the holidays
'Cause no matter how far away it's flown
You will find it's embarrassed you in a million ways
For the holidays you sure can't beat a drone

[**COLIN ONLY**:] Well there's a guy named John who got a drone
To photograph his aunt's house
But she lives within 5 miles of the airport
So John got heated and instead he flew
His drone over a crowd
When the Tower said "don't do it"
Our John he just said "screw it"

[ALL TEAM AND INN MEMBERS:]
Oh, there's no gift like a drone for the holidays
'Cause no matter how far away it's flown
You will find it's embarrassed you in a million ways
For the holidays you sure can't beat a drone

COLIN [LOUDLY]: HAPPY DRONING TO ALL AND TO ALL A GOOD FLIGHT!!!!!!!!!

END

U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Small Unmanned Aircraft Systems (sUAS)

Date: 6/21/16 **AC No:** 107-2

Initiated by: AFS-800 **Change:**

The Federal Aviation Administration (FAA) is amending its regulations to adopt specific rules for the operation of small Unmanned Aircraft Systems (sUAS) in the National Airspace System (NAS) through a final rule. These changes address the classification of sUAS, certification of sUAS remote pilots, and sUAS operational limitations. This advisory circular (AC) provides guidance for conducting sUAS operations in the NAS in accordance with Title 14 of the Code of Federal Regulations (14 CFR) part 107.

John S. Duncan
Director, Flight Standards Service

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CHAPTER 1. GENERAL

1.1 Purpose. This advisory circular (AC) provides guidance in the areas of airman (remote pilot) certification, aircraft registration and marking, aircraft airworthiness, and the operation of small Unmanned Aircraft Systems (sUAS) in the National Airspace System (NAS) to promote compliance with the requirements of Title 14 of the Code of Federal Regulations (14 CFR) Part 107, Small Unmanned Aircraft Systems. It does not provide, nor is it intended to provide, a legal interpretation of the regulations. Remote pilots are encouraged to use this information as best practice methods for developing operational programs scaled to specific small unmanned aircraft (UA), associated system equipment, and operations. Use of this AC is intended to assist the remote pilot in meeting the requirements of applicable 14 CFR regulations.

1.1.1 Acceptable Means of Compliance (AMC). This AC uses mandatory terms, such as "must," only in the sense of ensuring applicability of these particular methods of compliance when using the AMC described herein. This AC is not mandatory and does not constitute a regulation. This AC does not change, add to, or delete regulatory requirements or authorize deviations from regulatory requirements.

1.1.2 Part 107 Provisions. This AC is not intended to cover every provision of part 107. Rather, this AC is intended to provide guidance on those provisions of part 107 where additional information may be helpful. The Federal Aviation Administration (FAA) emphasizes, however, that persons subject to part 107 are responsible for complying with every applicable provision of part 107, regardless of whether the provision is discussed in this AC.

1.1.3 Privacy-Related Laws. Part 107 operators should be aware that state and local authorities may enact privacy-related laws specific to Unmanned Aircraft System (UAS) operations. The FAA encourages sUAS operators to review those laws prior to operating their UAS. The National Telecommunications and Information Administration (NTIA) has also published the Voluntary Best Practices for UAS Privacy, Transparency, and Accountability (https://www.ntia.doc.gov/files/ntia/publications/voluntary_best_practices_for_uas_privacy_transparency_and_accountability_0.pdf). This document outlines and describes voluntary best practices that UAS operators could take to advance UAS privacy, transparency, and accountability for the private and commercial use of UAS.

1.2 Request for Information. Direct comments and suggestions for improving this publication to:

Federal Aviation Administration
General Aviation and Commercial Division (AFS-800)
55 M Street SE, 8th Floor, Zone 1
Washington, DC 20003

CHAPTER 2. REFERENCES

2.1 Related Code of Federal Regulations (CFR) Parts. The following regulations and parts can be found at http://www.faa.gov/regulations_policies/faa_regulations/.

- Title 14 CFR Part 1, Definitions and Abbreviations.
- Title 14 CFR Part 48, Registration and Marking Requirements for Small Unmanned Aircraft.
- Title 14 CFR Part 71, Designation of Class A, B, C, D, and E Airspace Areas; Air Traffic Service Routes; and Reporting Points.
- Title 14 CFR Part 73, Special Use Airspace.
- Title 14 CFR Part 91, General Operating and Flight Rules.
- Title 14 CFR Part 93, Special Air Traffic Rules.
- Title 14 CFR Part 101, Moored Balloons, Kites, Amateur Rockets and Unmanned Free Balloons.
- Title 14 CFR Part 107, Small Unmanned Aircraft Systems.
- Title 47 CFR Part 87, Aviation Services.

2.2 Notices to Airmen (NOTAM). Information on how to obtain NOTAMs can be found at https://pilotweb.nas.faa.gov/PilotWeb/.

2.3 Related Reference Material. The following listed reference materials contain additional information necessary to ensure safe operations in the NAS. An sUAS operator may want to consider seeking out additional publications to supplement the lists below.

2.3.1 FAA ACs, Notices, and Orders (current editions). You can find the current editions of the following publications on the FAA Web sites: http://www.faa.gov/regulations_policies/advisory_circulars/ and http://www.faa.gov/regulations_policies/orders_notices/.

- AC 00-6, Aviation Weather.
- AC 00-45, Aviation Weather Services.
- AC 60-28, FAA English Language Skill Standards Required by 14 CFR Parts 61, 63, and 65.
- AC 120-92, Safety Management Systems for Aviation Service Providers.
- FAA Order JO 7110.10, Flight Services.
- FAA Order JO 7110.65, Air Traffic Control.
- FAA Order JO 7210.3, Facility Operation and Administration.
- FAA Order JO 7400.9, Airspace Designations and Reporting Points.

- FAA Order 8130.34, Airworthiness Certification of Unmanned Aircraft Systems and Optionally Piloted Aircraft.
- FAA Order 8900.1, Flight Standards Information Management System (FSIMS).

2.3.2 Additional FAA Online/Mobile Sources.

- UAS Web site: https://www.faa.gov/uas/.
- UAS Registration Web site: https://registermyuas.faa.gov/.
- B4UFLY mobile app.

2.3.3 FAA Handbooks, Manuals, and Other Publications. You can find the following handbooks, manuals, and other publications on the FAA Web site at http://www.faa.gov/regulations_policies/handbooks_manuals/.

- Aeronautical Information Manual (AIM): http://www.faa.gov/air_traffic/publications/.
- Aeronautical Charts (Hardcopy): http://faacharts.faa.gov/.
- Aeronautical Charts (Digital): http://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/.
- Pilot/Controller Glossary: http://www.faa.gov/air_traffic/publications/.
- Pilot's Handbook of Aeronautical Knowledge: http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/pilot_handbook/.
- General Aviation Pilot's Guide to Preflight Weather Planning, Weather Self-Briefings, and Weather Decision Making: www.faa.gov/nextgen/update/media/ga_weather_decision_making.pdf.
- Risk Management Handbook: http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/media/faa-h-8083-2.pdf.
- FAA Small Unmanned Aircraft Systems Airman Certification Standards: (TBD).

2.3.4 RTCA, Inc. Documents (current editions). Copies of the current editions of the following RTCA, Inc. documents are available for purchase online at http://www.rtca.org.

- DO-178, Software Considerations in Airborne Systems and Equipment Certification.
- DO-304, Guidance Material and Considerations for Unmanned Aircraft Systems.

2.3.5 Public Law (PL). PL 112-95, Title III, Subtitle B—Unmanned Aircraft Systems.

CHAPTER 3. BACKGROUND

3.1 PL 112-95, Title III, Subtitle B. In 2012, Congress passed the FAA Modernization and Reform Act of 2012 (PL 112-95). PL 112-95, Section 333 directed the Secretary of Transportation to determine whether UAS operations posing the least amount of public risk and no threat to national security could safely be operated in the NAS and, if so, to establish requirements for the safe operation of these systems in the NAS, prior to completion of the UAS comprehensive plan and rulemakings required by PL 112-95, Section 332. On February 23, 2015, as part of its ongoing efforts to integrate UAS operations in the NAS and in accordance with PL 112-95, Section 333, the FAA issued a Notice of Proposed Rulemaking (NPRM) proposing to amend its regulations to adopt specific rules for the operation of sUAS in the NAS. Over 4,600 public comments were submitted in response to the NPRM. In consideration of the public comments, the FAA issued a final rule adding part 107, integrating civil sUAS into the NAS. Part 107 allows sUAS operations for many different non-hobby and nonrecreational purposes without requiring airworthiness certification, exemption, or a Certificate of Waiver or Authorization (COA). In addition, part 107 also applies to sUAS used for hobby or recreation that are not flown in accordance with part 101 subpart E (see paragraph 4.1).

3.2 Part 107—A Regulatory First Step. The FAA addresses aviation safety in three key areas: personnel, equipment, and operations. The FAA assesses each of these areas both independently to meet current regulations and standards, as well as collectively to ensure no conflicts exist overall that would create an unsafe condition. This approach allows the FAA to be flexible in responding to the needs of the aviation community while still being able to establish standards for future growth and development. To that end, part 107 contains subparts that focus on each of these key aviation safety areas specific to sUAS, and the chapters in this AC are organized in the same manner.

CHAPTER 4. PART 107 SUBPART A, GENERAL

4.1 Applicability. This chapter provides guidance regarding the applicability of part 107 to civil small UA operations conducted within the NAS. However, part 107 does not apply to the following:

1. Model aircraft that are operated in accordance with Part 101 Subpart E, Model Aircraft), which applies to model aircraft meeting all of the following criteria:
   - The aircraft is flown strictly for hobby or recreational use;
   - The aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization;
   - The aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;
   - The aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft;
   - When flown within 5 miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control (ATC) tower (when an air traffic facility is located at the airport) with prior notice of the operation;
   - The aircraft is capable of sustained flight in the atmosphere; and
   - The aircraft is flown within Visual Line of Sight (VLOS) of the person operating the aircraft.
2. Operations conducted outside the United States;
3. Amateur rockets;
4. Moored balloons;
5. Unmanned free balloons;
6. Kites;
7. Public aircraft operations; and
8. Air carrier operations.

4.2 Definitions. The following defined terms are used throughout this AC:

4.2.1 Control Station (CS). An interface used by the remote pilot or the person manipulating the controls to control the flight path of the small UA.

4.2.2 Corrective Lenses. Spectacles or contact lenses.

4.2.3 Model Aircraft. A UA that is:

- Capable of sustained flight in the atmosphere;
- Flown within VLOS of the person operating the aircraft; and
- Flown for hobby or recreational purposes.

4.2.4 Person Manipulating the Controls. A person other than the remote pilot in command (PIC) who is controlling the flight of an sUAS under the supervision of the remote PIC.

4.2.5 Remote Pilot in Command (Remote PIC or Remote Pilot). A person who holds a remote pilot certificate with an sUAS rating and has the final authority and responsibility for the operation and safety of an sUAS operation conducted under part 107.

4.2.6 Small Unmanned Aircraft (UA). A UA weighing less than 55 pounds, including everything that is onboard or otherwise attached to the aircraft, and can be flown without the possibility of direct human intervention from within or on the aircraft.

4.2.7 Small Unmanned Aircraft System (sUAS). A small UA and its associated elements (including communication links and the components that control the small UA) that are required for the safe and efficient operation of the small UA in the NAS.

4.2.8 Unmanned Aircraft (UA). An aircraft operated without the possibility of direct human intervention from within or on the aircraft.

4.2.9 Visual Observer (VO). A person acting as a flightcrew member who assists the small UA remote PIC and the person manipulating the controls to see and avoid other air traffic or objects aloft or on the ground.

4.3 Abbreviations/Acronyms Used in the Advisory Circular.

1. AC: Advisory Circular.
2. ACR: Airman Certification Representative.
3. AGL: Above Ground Level.
4. ATC: Air Traffic Control.
5. CFI: Certificated Flight Instructor.
6. CFR: Code of Federal Regulations.
7. DPE: Designated Pilot Examiner.
8. FAA: Federal Aviation Administration.
9. FSDO: Flight Standards District Office.
10. GPS: Global Positioning System.
11. IACRA: Integrated Airmen Certification and/or Rating Application.
12. KTC: Knowledge Testing Center.

13. MSL: Mean Sea Level.
14. NOTAM: Notice to Airmen.
15. NAS: National Airspace System.
16. PIC: Pilot in Command.
17. UA: Unmanned Aircraft.
18. UAS: Unmanned Aircraft System.
19. U.S.C.: United States Code.
20. VO: Visual Observer.

4.4 Falsification, Reproduction, or Alteration. The FAA relies on information provided by owners and remote pilots of sUAS when it authorizes operations or when it has to make a compliance determination. Accordingly, the FAA may take appropriate action against an sUAS owner, operator, remote PIC, or anyone else who fraudulently or knowingly provides false records or reports, or otherwise reproduces or alters any records, reports, or other information for fraudulent purposes. Such action could include civil sanctions and the suspension or revocation of a certificate or waiver.

4.5 Accident Reporting. The remote PIC of the sUAS is required to report an accident to the FAA within 10 days if it meets any of the following thresholds:

1. At least serious injury to any person or any loss of consciousness. A serious injury is an injury that qualifies as Level 3 or higher on the Abbreviated Injury Scale (AIS) of the Association for the Advancement of Automotive Medicine (AAAM). The AIS is an anatomical scoring system that provides a means of ranking the severity of an injury and is widely used by emergency medical personnel. Within the AIS system, injuries are ranked on a scale of 1 to 6, with Level 1 being a minor injury, Level 2 is moderate, Level 3 is serious, Level 4 is severe, Level 5 is critical, and Level 6 is a nonsurvivable injury. The FAA currently uses serious injury (AIS Level 3) as an injury threshold in other FAA regulations.

   Note: It would be considered a "serious injury" if a person requires hospitalization, but the injury is fully reversible (including, but not limited to, head trauma, broken bone(s), or laceration(s) to the skin that requires suturing).

2. Damage to any property, other than the small UA, if the cost is greater than $500 to repair or replace the property (whichever is lower).

   Note: For example, a small UA damages a property whose fair market value is $200, and it would cost $600 to repair the damage. Because the fair market value is below $500, this accident is not required to be reported. Similarly, if the aircraft causes $200 worth of damage to property whose fair market value is $600, that accident is also not required to be reported because the repair cost is below $500.

4.5.1 Submitting the Report. The accident report must be made within 10 calendar-days of the operation that created the injury or damage. The report may be submitted to the appropriate FAA Regional Operations Center (ROC) electronically or by telephone. Electronic reporting can be completed at www.faa.gov/uas/. To make a report by phone, see Figure 4-1, FAA Regional Operations Centers Telephone List. Reports may also be made to the nearest jurisdictional FSDO (http://www.faa.gov/about/office_org/field_offices/fsdo/). The report should include the following information:

1. sUAS remote PIC's name and contact information;
2. sUAS remote PIC's FAA airman certificate number;
3. sUAS registration number issued to the aircraft, if required (FAA registration number);
4. Location of the accident;
5. Date of the accident;
6. Time of the accident;
7. Person(s) injured and extent of injury, if any or known;
8. Property damaged and extent of damage, if any or known; and
9. Description of what happened.

Figure 4-1. FAA Regional Operations Centers Telephone List

FAA REGIONAL OPERATIONS CENTERS	
LOCATION WHERE ACCIDENT OCCURRED:	**TELEPHONE:**
DC, DE, MD, NJ, NY, PA, WV, and VA	**404-305-5150**
AL, CT, FL, GA, KY, MA, ME, MS, NC, NH, PR, RI, SC, TN, VI, and VT	**404-305-5156**
AK, AS, AZ, CA, CO, GU, HI, ID, MP, MT, NV, OR, UT, WA, and WY	**425-227-1999**
AR, IA, IL, IN, KS, LA, MI, MN, MO, ND, NE, NM, OH, OK, SD, TX, and WI	**817-222-5006**

4.5.2 National Transportation Safety Board (NTSB) Reporting. In addition to the report submitted to the ROC, and in accordance with the criteria established by the NTSB, certain sUAS accidents must also be reported to the NTSB. For more information, visit www.ntsb.gov.

CHAPTER 5. PART 107 SUBPART B, OPERATING LIMITATIONS FOR SMALL UNMANNED AIRCRAFT SYSTEMS (sUAS)

5.1 Applicability. This chapter provides guidance regarding sUAS operating limitations and the responsibilities of the remote pilot in command (PIC), person manipulating the controls, visual observer (VO), and anyone else that may be directly participating in the sUAS operation. A person is also a direct participant in the sUAS operation if his or her involvement is necessary for the safe operation of the sUAS.

5.2 Aircraft Operation. Just like a manned-aircraft PIC, the remote PIC of an sUAS is directly responsible for, and is the final authority as to, the operation of that UAS. The remote PIC will have final authority over the flight. Additionally, a person manipulating the controls can participate in flight operations under certain conditions. It is important to note that a person may not operate or act as a remote PIC or VO in the operation of more than one UA at the same time. The following items describe the requirements for both a remote PIC and a person manipulating the controls:

5.2.1 Remote PIC. A person acting as a remote PIC of an sUAS in the National Airspace System (NAS) under part 107 must obtain a remote pilot certificate with an sUAS rating issued by the FAA prior to sUAS operation. The remote PIC must have this certificate easily accessible during flight operations. Guidance regarding remote pilot certification is found in Chapter 6, Part 107 Subpart C, Remote Pilot Certification. Again, the remote PIC will have the final authority and responsibility for the operation and safety of an sUAS operation conducted under part 107.

5.2.1.1 Additionally, part 107 permits transfer of control of an sUAS between certificated remote pilots. Two or more certificated remote pilots transferring operational control (i.e., the remote PIC designation) to each other may do so only if they are both capable of maintaining Visual Line of Sight (VLOS) of the UA and without loss of control (LOC). For example, one remote pilot may be designated the remote PIC at the beginning of the operation, and then at some point in the operation another remote pilot may take over as remote PIC by positively communicating that he or she is doing so. As the person responsible for the safe operation of the UAS, any remote pilot who will assume remote PIC duties should meet all of the requirements of part 107, including awareness of factors that could affect the flight.

5.2.2 Person Manipulating the Flight Controls. A person who does not hold a remote pilot certificate or a remote pilot that that has not met the recurrent testing/training requirements of part 107 may operate the sUAS under part 107, as long as he or she is directly supervised by a remote PIC and the remote PIC has the ability to immediately take direct control of the sUAS. This ability is necessary to ensure that the remote PIC can quickly address any hazardous situation before an accident occurs. The ability for the remote PIC to immediately take over the flight controls could be achieved by using a number of different methods. For example, the operation could involve a “buddy box” type system that uses two control stations (CS): one for the person manipulating the flight controls and one for the remote PIC that allows the remote PIC to override the other CS

and immediately take direct control of the small UA. Another method could involve the remote PIC standing close enough to the person manipulating the flight controls so as to be able to physically take over the CS from the other person. A third method could employ the use of an automation system whereby the remote PIC could immediately engage that system to put the small UA in a pre-programmed "safe" mode (such as in a hover, in a holding pattern, or "return home").

5.2.3 Autonomous Operations. An autonomous operation is generally considered an operation in which the remote pilot inputs a flight plan into the CS, which sends it to the autopilot onboard the small UA. During automated flight, flight control inputs are made by components onboard the aircraft, not from a CS. Thus, the remote PIC could lose the control link to the small UA and the aircraft would still continue to fly the programmed mission/return home to land. During automated flight, the remote PIC also must have the ability to change routing/altitude or command the aircraft to land immediately. The ability to direct the small UA may be through manual manipulation of the flight controls or through commands using automation.

5.2.3.1 The remote PIC must retain the ability to direct the small UA to ensure compliance with the requirements of part 107. There are a number of different methods that a remote PIC may utilize to direct the small UA to ensure compliance with part 107. For example, the remote pilot may transmit a command for the autonomous aircraft to climb, descend, land now, proceed to a new waypoint, enter an orbit pattern, or return to home. Any of these methods may be used to satisfactorily avoid a hazard or give right of way.

5.2.3.2 The use of automation does not allow a person to simultaneously operate more than one small UA.

5.3 Aeronautical Decision-Making (ADM) and Crew Resource Management (CRM). ADM is a systematic approach to the mental process used by pilots to consistently determine the best course of action in response to a given set of circumstances. A remote PIC uses many different resources to safely operate an sUAS and needs to be able to manage these resources effectively. CRM is a component of ADM, where the pilot of sUAS makes effective use of all available resources: human resources, hardware, and information. Many remote pilots operating under part 107 may use a VO, oversee other persons manipulating the controls of the small UA, or any other person who the remote PIC may interact with to ensure safe operations. Therefore, a remote PIC must be able to function in a team environment and maximize team performance. This skill set includes situational awareness, proper allocation of tasks to individuals, avoidance of work overloads in self and in others, and effectively communicating with other members of the crew, such as VOs and persons manipulating the controls of an sUAS. Appendix A, Risk Assessment Tools, contains expanded information on ADM and CRM, as well as sample risk assessment tools to aid in identifying hazards and mitigating risks.

5.4 Aircraft Registration. A small UA must be registered, as provided for in 14 CFR part 47 or part 48 prior to operating under part 107. Part 48 is the regulation that establishes the streamlined online registration option for sUAS that will be operated only within the

territorial limits of the United States. The online registration Web address is http://www.faa.gov/uas/registration/. Guidance regarding sUAS registration and marking may be found at http://www.faa.gov/licenses_certificates/aircraft_certification/aircraft_registry/. Alternatively, sUAS can elect to register under part 47 in the same manner as manned aircraft.

5.4.1 Registration of Foreign-Owned and Operated sUAS. If sUAS operations involve the use of foreign civil aircraft, the operator would need to obtain a Foreign Aircraft Permit pursuant to 14 CFR part 375, § 375.41 before conducting any commercial air operations under this authority. Foreign civil aircraft means, a) an aircraft of foreign registry that is not part of the armed forces of a foreign nation, or b) a U.S.-registered aircraft owned, controlled, or operated by persons who are not citizens or permanent residents of the United States. Application instructions are specified in § 375.43. Applications should be submitted by electronic mail to the Department of Transportation (DOT) Office of International Aviation, Foreign Air Carrier Licensing Division. Additional information can be obtained at https://cms.dot.gov/policy/aviation-policy/licensing/foreign-carriers.

5.5 sUAS Maintenance, Inspections, and Condition for Safe Operation. An sUAS must be maintained in a condition for safe operation. Prior to flight, the remote PIC is responsible for conducting a check of the sUAS and verifying that it is actually in a condition for safe operation. Guidance regarding how to determine that an sUAS is in a condition for safe operation is found in Chapter 7, sUAS Maintenance and Inspection.

5.6 Medical Condition. Being able to safely operate the sUAS relies on, among other things, the physical and mental capabilities of the remote PIC, person manipulating the controls, VO, and any other direct participant in the sUAS operation. Though the person manipulating the controls of an sUAS and VO are not required to obtain an airman medical certificate, they may not participate in the operation of an sUAS if they know or have reason to know that they have a physical or mental condition that could interfere with the safe operation of the sUAS.

5.6.1 Physical or Mental Incapacitations. Obvious examples of physical or mental incapacitations that could render a remote PIC, person manipulating the controls, or VO incapable of performing their sUAS operational duties include, but are not limited to, such things as:

1. The temporary or permanent loss of the dexterity necessary to operate the CS to safely control the small UA.
2. The inability to maintain the required “see and avoid” vigilance due to blurred vision.
3. The inability to maintain proper situational awareness of the small UA operations due to illness and/or medication(s), such as after taking medications with cautions not to drive or operate heavy machinery.
4. A debilitating physical condition, such as a migraine headache or moderate or severe body ache(s) or pain(s) that would render the remote PIC, person manipulating the controls, or VO unable to perform sUAS operational duties.

5. A hearing or speaking impairment that would inhibit the remote PIC, person manipulating the controls, and VO from effectively communicating with each other. In a situation such as this, the remote PIC must ensure that an alternative means of effective communication is implemented. For example, a person who is hearing impaired may be able to effectively use sign language to communicate.

5.7 VLOS Aircraft Operation. The remote PIC and person manipulating the controls must be able to see the small UA at all times during flight. Therefore, the small UA must be operated closely enough to the CS to ensure visibility requirements are met during small UA operations. This requirement also applies to the VO, if used during the aircraft operation. However, the person maintaining VLOS may have brief moments in which he or she is not looking directly at or cannot see the small UA, but still retains the capability to see the UA or quickly maneuver it back to VLOS. These moments can be for the safety of the operation (e.g., looking at the controller to see battery life remaining) or for operational necessity. For operational necessity, the remote PIC or person manipulating the controls may intentionally maneuver the UA so that he or she loses sight of it for brief periods of time. Should the remote PIC or person manipulating the controls lose VLOS of the small UA, he or she must regain VLOS as soon as practicable. For example, a remote PIC stationed on the ground utilizing a small UA to inspect a rooftop may lose sight of the aircraft for brief periods while inspecting the farthest point of the roof. As another example, a remote PIC conducting a search operation around a fire scene with a small UA may briefly lose sight of the aircraft while it is temporarily behind a dense column of smoke. However, it must be emphasized that even though the remote PIC may briefly lose sight of the small UA, he or she always has the see-and-avoid responsibilities set out in part 107, §§ 107.31 and 107.37. The circumstances of what would prevent a remote PIC from fulfilling those responsibilities will vary, depending on factors such as the type of UAS, the operational environment, and distance between the remote PIC and the UA. For this reason, there is no specific time interval that interruption of VLOS is permissible, as it would have the effect of potentially allowing a hazardous interruption or prohibiting a reasonable one. If VLOS cannot be regained, the remote PIC or person manipulating the controls should follow pre-determined procedures for a loss of VLOS. These procedures are determined by the capabilities of the sUAS and may include immediately landing the UA, entering hover mode, or returning to home sequence. Thus, the VLOS requirement would not prohibit actions such as scanning the airspace or briefly looking down at the small UA CS.

5.7.1 Unaided Vision. VLOS must be accomplished and maintained by unaided vision, except vision that is corrected by the use of eyeglasses (spectacles) or contact lenses. Vision aids, such as binoculars, may be used only momentarily to enhance situational awareness. For example, the remote PIC, person manipulating the controls, or VO may use vision aids to avoid flying over persons or conflicting with other aircraft. Similarly, first person view devices may be used during operations, but do not satisfy the VLOS requirement. While the rule does not set specific vision standards, the FAA recommends that remote PICs, persons manipulating the controls, and VOs maintain 20/20 distant vision acuity (corrected) and normal field of vision.

5.7.2 VO. The use of a VO is optional. The remote PIC may choose to use a VO to supplement situational awareness and VLOS. Although the remote PIC and person manipulating the controls must maintain the capability to see the UA, using one or more VOs allows the remote PIC and person manipulating the controls to conduct other mission-critical duties (such as checking displays) while still ensuring situational awareness of the UA. The VO must be able to effectively communicate:

- The small UA location, attitude, altitude, and direction of flight;
- The position of other aircraft or hazards in the airspace; and
- The determination that the UA does not endanger the life or property of another.

5.7.2.1 To ensure that the VO can carry out his or her duties, the remote PIC must ensure that the VO is positioned in a location where he or she is able to see the small UA sufficiently to maintain VLOS. The remote PIC can do this by specifying the location of the VO. The FAA also requires that the remote PIC and VO coordinate to 1) scan the airspace where the small UA is operating for any potential collision hazard, and 2) maintain awareness of the position of the small UA through direct visual observation. This would be accomplished by the VO maintaining visual contact with the small UA and the surrounding airspace, and then communicating to the remote PIC and person manipulating the controls the flight status of the small UA and any hazards which may enter the area of operation, so that the remote PIC or person manipulating the controls can take appropriate action.

5.7.2.2 To make this communication possible, the remote PIC, person manipulating the controls, and VO must work out a method of effective communication, which does not create a distraction and allows them to understand each other. The communication method must be determined prior to operation. This effective communication requirement would permit the use of communication-assisting devices, such as a hand-held radio, to facilitate communication from a distance.

5.8 Operation Near Airports; in Certain Airspace; in Prohibited or Restricted Areas; or in the Proximity of Certain Areas Designated by a Notice to Airmen (NOTAM). Though many sUAS operations will occur in uncontrolled airspace, there are some that may need to operate in controlled airspace. Operations in Class B, Class C, or Class D airspace, or within the lateral boundaries of the surface area of Class E airspace designated for an airport, are not allowed unless that person has prior authorization from air traffic control (ATC). The link to the current authorization process can be found at www.faa.gov/uas/. The sUAS remote PIC must understand airspace classifications and requirements. Failure to do so would be in violation of the part 107 regulations and may potentially have an adverse safety effect. Although sUAS will not be subject to part 91, the equipage and communications requirements outlined in part 91 were designed to provide safety and efficiency in controlled airspace. Accordingly, while sUAS operating under part 107 are not subject to part 91, as a practical matter, ATC authorization or clearance may depend on operational parameters similar to those found in part 91. The

FAA has the authority to approve or deny aircraft operations based on traffic density, controller workload, communication issues, or any other type of operations that could potentially impact the safe and expeditious flow of air traffic in that airspace. Those planning sUAS operations in controlled airspace are encouraged to contact the FAA as early as possible. (For suggested references, please see paragraph 2.3.)

5.8.1 Small UA Operations Near an Airport—Notification and Permissions. Unless the flight is conducted within controlled airspace, no notification or authorization is necessary to operate at or near an airport. When operating in the vicinity of an airport, the remote PIC must be aware of all traffic patterns and approach corridors to runways and landing areas. The remote PIC must avoid operating anywhere that the presence of the sUAS may interfere with operations at the airport, such as approach corridors, taxiways, runways, or helipads. Furthermore, the remote PIC must yield right-of-way to all other aircraft, including aircraft operating on the surface of the airport.

5.8.1.1 Remote PICs are prohibited from operating their small UA in a manner that interferes with operations and traffic patterns at airports, heliports, and seaplane bases. While a small UA must always yield right-of-way to a manned aircraft, a manned aircraft may alter its flightpath, delay its landing, or take off in order to avoid an sUAS that may present a potential conflict or otherwise affect the safe outcome of the flight. For example, a UA hovering 200 feet above a runway may cause a manned aircraft holding short of the runway to delay takeoff, or a manned aircraft on the downwind leg of the pattern to delay landing. While the UA in this scenario would not pose an immediate traffic conflict to the aircraft on the downwind leg of the traffic pattern or to the aircraft intending to take off, nor would it violate the right-of-way provision of § 107.37(a), the small UA would have interfered with the operations of the traffic pattern at an airport.

5.8.1.2 In order to avoid interfering with operations in a traffic pattern, remote PICs should avoid operating in the traffic pattern or published approach corridors used by manned aircraft. When operational necessity requires the remote PIC to operate at an airport in uncontrolled airspace, the remote PIC should operate the small UA in such a way that the manned aircraft pilot does not need to alter his or her flightpath in the traffic pattern or on a published instrument approach in order to avoid a potential collision. Because remote PICs have an obligation to yield right-of-way to all other aircraft and avoid interfering in traffic pattern operations, the FAA expects that most remote PICs will avoid operating in the vicinity of airports because their aircraft generally do not require airport infrastructure, and the concentration of other aircraft increases in the vicinity of airports.

5.8.2 Air Traffic Organization (ATO). The ATO does not have the authority to deny sUAS operations on the basis of equipage that exceeds the part 107 requirements. Because additional equipage and technologies, such as geo-fencing, have not been certificated by the FAA, they need to be examined on a case-by-case basis in order for the FAA to determine their reliability and functionality. Additionally, requiring ATC to review

equipage would place a burden on ATC and detract from other duties. Instead, a remote pilot who wishes to operate in controlled airspace because he or she can demonstrate mitigations through equipage may do so by applying for a waiver (see paragraph 5.19).

5.8.3 Recurring or Long-Term Operations. For recurring or long-term operations in a given volume of controlled airspace, prior authorization could perhaps include a letter of agreement (LOA) to identify shortfalls and establish operating procedures for sUAS. This LOA will outline the ability to integrate into the existing air traffic operation and may improve the likelihood of access to the airspace where operations are proposed. This agreement will ensure all parties involved are aware of limitations and conditions and will enable the safe flow of aircraft operations in that airspace. For short-term or short-notice operations proposed in controlled airport airspace, a LOA may not be feasible. Prior authorization is required in all cases.

5.8.4 Temporary Flight Restrictions. Certain temporary flight restrictions (http://tfr.faa.gov/tfr2/list.html) may be imposed by way of a NOTAM (https://pilotweb.nas.faa.gov/PilotWeb/). Therefore, it is necessary for the sUAS remote PIC to check for NOTAMs before each flight to determine if there are any applicable airspace restrictions.

5.8.5 Type of Airspace. It is important that sUAS remote PICs also be aware of the type of airspace in which they will be operating their small UA. Referring to the B4UFly app or a current aeronautical chart (http://faacharts.faa.gov/) of the intended operating area will aid the sUAS remote PIC's decisionmaking regarding operations in the NAS.

5.9 Preflight Familiarization, Inspection, and Actions for Aircraft Operation. The remote PIC must complete a preflight familiarization, inspection, and other actions, such as crewmember briefings, prior to beginning flight operations. The FAA has produced many publications providing in-depth information on topics such as aviation weather, aircraft loading and performance, emergency procedures, ADM, and airspace, which should all be considered prior to operations (see paragraph 5.20). Additionally, all remote pilots are encouraged to review FAA publications (see paragraph 2.3).

5.9.1 Prior to Flight. The remote PIC must:

1. Conduct an assessment of the operating environment. The assessment must include at least the following:
    - Local weather conditions,
    - Local airspace and any flight restrictions,
    - The location of persons and property on the surface, and
    - Other ground hazards.

2. Ensure that all persons directly participating in the small UA operation are informed about the following:
    - Operating conditions,
    - Emergency procedures,
    - Contingency procedures,
    - Roles and responsibilities of each person involved in the operation, and
    - Potential hazards.
3. Ensure that all control links between the CS and the small UA are working properly. For example, before each flight, the remote PIC must determine that the small UA flight control surfaces necessary for the safety of flight are moving correctly through the manipulation of the small UA CS. If the remote PIC observes that one or more of the control surfaces are not responding correctly to CS inputs, then the remote PIC may not conduct flight operations until correct movement of all flight control surface(s) is established.
4. Ensure there is sufficient power to continue controlled flight operations to a normal landing. One of the ways that this could be done is by following the sUAS manufacturer's operating manual power consumption tables. Another method would be to include a system on the sUAS that detects power levels and alerts the remote pilot when remaining aircraft power is diminishing to a level that is inadequate for continued flight operation.
5. Ensure that any object attached or carried by the small UA is secure and does not adversely affect the flight characteristics or controllability of the aircraft.
6. Ensure that all necessary documentation is available for inspection, including the remote PIC's remote pilot certificate, aircraft registration (if required), and Certificate of Waiver (CoW) (if applicable).

5.9.2 Safety Risk Assessment. These preflight familiarizations, inspections, and actions can be accomplished as part of an overall safety risk assessment. The FAA encourages the remote PIC to conduct the overall safety risk assessment as a method of compliance with the prohibition on operations over certain persons and the requirement to remain clear of other aircraft, which are discussed in paragraphs 5.11 and 5.12. Appendix A provides additional guidance on how to conduct an overall safety risk assessment.

5.10 Operating Limitations for Small UA. The small UA must be operated in accordance with the following limitations:

- Cannot be flown faster than a groundspeed of 87 knots (100 miles per hour);
- Cannot be flown higher than 400 feet above ground level (AGL), unless flown within a 400-foot radius of a structure and does not fly higher than 400 feet above the structure's immediate uppermost limit;
- Minimum visibility, as observed from the location of the CS, may not be less than 3 statute miles (sm); and

- Minimum distance from clouds being no less than 500 feet below a cloud and no less than 2000 feet horizontally from the cloud.

Note: These operating limitations are intended, among other things, to support the remote pilot's ability to identify hazardous conditions relating to encroaching aircraft or persons on the ground, and to take the appropriate actions to maintain safety.

5.10.1 Determining Groundspeed. There are many different types of sUAS and different ways to determine groundspeed. Therefore, this guidance will only touch on some of the possible ways for the remote PIC to ensure that the small UA does not exceed a groundspeed of 87 knots during flight operations. Some of the possible ways to ensure that 87 knots is not exceeded are as follows:

- Installing a Global Positioning System (GPS) device on the small UA that reports groundspeed information to the remote pilot, wherein the remote pilot takes into account the wind direction and speed and calculates the small UA airspeed for a given direction of flight, or
- Timing the groundspeed of the small UA when it is flown between two or more fixed points, taking into account wind speed and direction between each point, then noting the power settings of the small UA to operate at or less than 87 knots groundspeed, or
- Using the small UA's manufacturer design limitations (e.g., installed groundspeed limiters).

5.10.2 Determining Altitude. In order to comply with the maximum altitude requirements of part 107, as with determining groundspeed, there are multiple ways to determine a small UA's altitude above the ground or structure. Some possible ways for a remote pilot to determine altitude are as follows:

- Installing a calibrated altitude reporting device on the small UA that reports the small UA altitude above mean sea level (MSL) to the remote pilot, wherein the remote pilot subtracts the MSL elevation of the CS from the small UA reported MSL altitude to determine the small UA AGL altitude above the terrain or structure;
- Installing a GPS device on the small UA that also has the capability of reporting MSL altitude to the remote pilot;
- With the small UA on the ground, have the remote pilot and VO pace off 400 feet from the small UA to get a visual perspective of the small UA at that distance, wherein the remote pilot and VO maintain that visual perspective or closer while the small UA is in flight; or
- Using the known height of local rising terrain and/or structures as a reference.

5.10.3 Visibility and Distance from Clouds. Once the remote PIC and VO have been able to reliably establish the small UA AGL altitude, it is incumbent on the remote PIC to determine that visibility from the CS is at least 3 sm and that the small UA is kept at least 500 feet below a cloud and at least 2,000 feet horizontally from a cloud. One of the ways

to ensure adherence to the minimum visibility and cloud clearance requirements is to obtain local aviation weather reports that include current and forecast weather conditions. If there is more than one local aviation reporting station near the operating area, the remote PIC should choose the closest one that is also the most representative of the terrain surrounding the operating area. If local aviation weather reports are not available, then the remote PIC may not operate the small UA if he or she is not able to determine the required visibility and cloud clearances by other reliable means. It is imperative that the UA not be operated above any cloud, and that there are no obstructions to visibility, such as smoke or a cloud, between the UA and the remote PIC.

5.11 Prohibited Operation Over Persons. Part 107 prohibits a person from flying a small UA directly over a person who is not under a safe cover, such as a protective structure or a stationary vehicle. However, a small UA may be flown over a person who is directly participating in the operation of the sUAS, such as the remote PIC, other person manipulating the controls, a VO, or crewmembers necessary for the safety of the sUAS operation, as assigned and briefed by the remote PIC. There are several ways that the sUAS remote PIC can comply with these requirements, such as:

- Selecting an operational area (site) that is clearly unpopulated/uninhabited. If selecting a site that is populated/inhabited, have a plan of action which ensures persons remain clear of the operating area, remain indoors, or remain under safe cover until such time that the small UA flight has ended. Safe cover is a structure or stationary vehicle that would protect a person from harm if the small UA were to crash into that structure or vehicle;
- Establishing an operational area in which the remote PIC has taken reasonable precautions to keep free of persons not directly participating in the operation of the sUAS;
- Choosing an operating area that is sparsely populated, or, ideally, clear of persons if operating a small UA from a moving vehicle;
- Having a plan of action that ensures the small UA remains clear of persons who may enter the operating area.
- Adopt an appropriate operating distance from persons not directly participating in the operation of the sUAS.

5.12 Remaining Clear of Other Aircraft. A remote PIC has a responsibility to operate the small UA so it remains clear of and yields to all other aircraft. This is traditionally referred to as “see and avoid.” To satisfy this responsibility, the remote PIC must know the location and flight path of his or her small UA at all times. The remote PIC must be aware of other aircraft, persons, and property in the vicinity of the operating area, and maneuver the small UA to avoid a collision, as well as prevent other aircraft from having to take action to avoid the small UA.

5.13 Operations from Moving Vehicles. Part 107 permits operation of an sUAS from a moving land or water-borne vehicle over a sparsely-populated area. However, operation from a moving aircraft is prohibited. Additionally, small UA transporting another

person's property for compensation or hire may not be operated from any moving vehicle.

5.13.1 Waiving the Sparsely-Populated Area Provision. Although the regulation states that operations from a moving vehicle may only be conducted over a sparsely-populated area, this provision may be waived (see paragraph 5.19). The operation is subject to the same restrictions that apply to all other part 107 operations. For instance, the remote PIC operating from a moving vehicle is still required to maintain VLOS and operations are still prohibited over persons not directly involved in the operation of the sUAS unless under safe cover. The remote PIC is also responsible for ensuring that no person is subject to undue risk as a result of LOC of the small UA for any reason. If a VO is not located in the same vehicle as the remote PIC, the VO and remote PIC must still maintain effective communication.

5.13.2 Careless or Reckless Operation of sUAS. Part 107 also prohibits careless or reckless operation of an sUAS. Flying an sUAS while driving a moving vehicle is considered to be careless or reckless because the person's attention would be hazardously divided. Therefore, the remote PIC or person manipulating the flight controls cannot operate an sUAS and drive a moving vehicle in a safe manner and remain in compliance with part 107.

5.13.3 Applicable Laws. Other laws, such as state and local traffic laws, may also apply to the conduct of a person driving a vehicle. Many states currently prohibit distracted driving and state or local laws may also be amended in the future to impose restrictions on how cars and public roads may be used with regard to an sUAS operation. The FAA emphasizes that people involved in an sUAS operation are responsible for complying with all applicable laws and not just the FAA's regulations.

5.14 Transportation of Property. Part 107 permits transportation of property by sUAS for compensation or hire. These operations must be conducted within a confined area and in compliance with the operating restrictions of part 107. When conducting the transportation of property, the transport must occur wholly within the bounds of a state. It may not involve transport between, 1) Hawaii and another place in Hawaii through airspace outside Hawaii, 2) the District of Columbia (DC) and another place in DC, or 3) a territory or possession of the United States and another place in the same territory or possession, as this is defined by statute as interstate air transportation.

5.14.1 Limitations. As with other operations in part 107, sUAS operations involving the transport of property must be conducted within VLOS of the remote pilot. While the VLOS limitation can be waived for some operations under the rule, it cannot for transportation of property. Additionally, part 107 does not allow the operation of an sUAS from a moving vehicle or aircraft if the small UA is being used to transport property for compensation or hire. This limitation cannot be waived. The maximum total weight of the small UA (including any property being transported) is limited to under 55 pounds. Additionally, other provisions of part 107 require the remote pilot to know the UA's location; to determine the UA's attitude, altitude, and direction; to yield the right-of-way to other aircraft; and to maintain the ability to see and avoid other aircraft.

5.14.2 Hazardous Materials. Part 107 does not allow the carriage of hazardous materials because the carriage of hazardous materials poses a higher level of risk.

5.15 Operations while Impaired. Part 107 does not allow operation of an sUAS if the remote PIC, person manipulating the controls, or VO is unable to safely carry out his or her responsibilities. It is the remote PIC's responsibility to ensure all crewmembers are not participating in the operation while impaired. While drug and alcohol use are known to impair judgment, certain over-the-counter medications and medical conditions could also affect the ability to safely operate a small UA. For example, certain antihistamines and decongestants may cause drowsiness. We also emphasize that part 107 prohibits a person from serving as a remote PIC, person manipulating the controls, VO, or other crewmember if he or she:

- Consumed any alcoholic beverage within the preceding 8 hours;
- Is under the influence of alcohol;
- Has a blood alcohol concentration of .04 percent or greater; and/or
- Is using a drug that affects the person's mental or physical capabilities.

5.15.1 Medical Conditions. Certain medical conditions, such as epilepsy, may also create a risk to operations. It is the remote PIC's responsibility to determine that their medical condition is under control and they can safely conduct a UAS operation.

5.16 Daylight Operations. Part 107 prohibits operation of an sUAS at night, which is defined in part 1 as the time between the end of evening civil twilight and the beginning of morning civil twilight, as published in The Air Almanac, converted to local time. In the continental United States (CONUS), evening civil twilight is the period of sunset until 30 minutes after sunset and morning civil twilight is the period of 30 minutes prior to sunrise until sunrise. In Alaska, the definition of civil twilight differs and is described in The Air Almanac. The Air Almanac provides tables which are used to determine sunrise and sunset at various latitudes. These tables can also be downloaded from the Naval Observatory and customized for your location. The link for the Naval Observatory is http://aa.usno.navy.mil/publications/docs/aira.php.

5.16.1 Civil Twilight Operations. When sUAS operations are conducted during civil twilight, the small UA must be equipped with anticollision lights that are capable of being visible for at least 3 sm. However, the remote PIC may reduce the visible distance of the lighting less than 3 sm during a given flight if he or she has determined that it would be in the interest of safety to do so, for example if it impacts his or her night vision. sUAS not operated during civil twilight are not required to be equipped with anti-collision lighting.

5.17 In-Flight Emergency. An in-flight emergency is an unexpected and unforeseen serious occurrence or situation that requires urgent, prompt action. In case of an in-flight emergency, the remote PIC is permitted to deviate from any rule of part 107 to the extent necessary to respond to that emergency. A remote PIC who exercises this emergency power to deviate from the rules of part 107 is required, upon FAA request, to send a

written report to the FAA explaining the deviation. Emergency action should be taken in such a way as to minimize injury or damage to property.

5.18 Careless or Reckless Operation. As with manned aircraft, remote PICs are prohibited from engaging in a careless or reckless operation. We also note that because sUAS have additional operating considerations that are not present in manned aircraft operations, there may be additional activity that would be careless or reckless if conducted using an sUAS. For example, failure to consider weather conditions near structures, trees, or rolling terrain when operating in a densely populated area could be determined as careless or reckless operation.

5.19 Certificate of Waiver. Part 107 includes the option to apply for a Certificate of Waiver (CoW). This CoW will allow an sUAS operation to deviate from certain provisions of part 107 if the Administrator finds that the proposed operation can be safely conducted under the terms of that CoW. A list of the waivable sections of part 107 can be found in § 107.205 and are listed below:

- Section 107.25, Operation from a moving vehicle or aircraft. However, no waiver of this provision will be issued to allow the carriage of property of another by aircraft for compensation or hire.
- Section 107.29, Daylight operation.
- Section 107.31, Visual line of sight aircraft operation. However, no waiver of this provision will be issued to allow the carriage of property of another by aircraft for compensation or hire.
- Section 107.33, Visual observer.
- Section 107.35, Operation of multiple small unmanned aircraft systems.
- Section 107.37(a), Yielding the right of way.
- Section 107.39, Operation over people.
- Section 107.41, Operation in certain airspace.
- Section 107.51, Operating limitations for small unmanned aircraft.

5.19.1 Applying for a CoW. To apply for a CoW under § 107.200, an applicant must go to www.faa.gov/uas/ and follow the instructions.

5.19.2 Application Process. The application must contain a complete description of the proposed operation and a justification, including supporting data and documentation (as necessary), that establishes that the proposed operation can safely be conducted under the terms of a CoW. Although not required by part 107, the FAA encourages applicants to submit their application at least 90 days prior to the start of the proposed operation. The FAA will strive to complete review and adjudication of waivers within 90 days; however, the time required for the FAA to make a determination regarding waiver requests will vary based on the complexity of the request. The amount of data and analysis required as part of the application will be proportional to the specific relief that is requested. For example, a

request to waive several sections of part 107 for an operation that takes place in a congested metropolitan area with heavy air traffic will likely require significantly more data and analysis than a request to waive a single section for an operation that takes place in a sparsely-populated area with minimal air traffic. If a CoW is granted, that certificate may include specific special provisions designed to ensure that the sUAS operation may be conducted as safely as one conducted under the provisions of part 107. A listing of standard special provisions for part 107 waivers will be available on the FAA's Web site at http://www.faa.gov/uas/.

5.20 Supplemental Operational Information. Appendix B, Supplemental Operational Information, contains expanded information regarding operational topics that should be considered prior to operations.

CHAPTER 6. PART 107 SUBPART C, REMOTE PILOT CERTIFICATION

6.1 Applicability. This chapter provides guidance regarding the airman certification requirements and procedures for persons acting as remote pilot in command (PIC) of a small UA operated in the National Airspace System (NAS). In the aviation context, the FAA typically refers to "licensing" as "certification."

6.2 Remote Pilot Certification. A person exercising the authority of PIC in compliance with part 107 is considered a "remote pilot in command" (remote PIC). As such, prior to acting as remote PIC, he or she must obtain a remote pilot certificate with an sUAS rating.

6.3 Eligibility. A person applying for a remote pilot certificate with an sUAS rating must meet and maintain the following eligibility requirements, as applicable:

- Be at least 16 years of age.
- Be able to read, speak, write, and understand the English language. However, the FAA may make an exception if the person is unable to meet one of these requirements due to medical reasons, such as a hearing impairment.
- Be in a physical and mental condition that would not interfere with the safe operation of an sUAS.
- Pass the initial aeronautical knowledge test at an FAA-approved knowledge testing center (KTC). However, a person who already holds a pilot certificate issued under 14 CFR part 61, except a student pilot certificate, and has successfully completed a flight review in accordance with part 61 within the previous 24 calendar-months is only required to successfully complete a part 107 online training course, found at www.faasafety.gov. For more information concerning aeronautical knowledge tests and training, see paragraph 6.6.

6.4 Application Process. This paragraph provides guidance on how a person can apply for a remote pilot certificate.

6.4.1 Applicants Without Part 61 Certificates. A person who does not have a part 61 pilot certificate or a part 61 certificate holder who has not completed a part 61 flight review in the previous 24 calendar-months must use the following process. A part 61 pilot who has completed a flight review within the previous 24 calendar-months may elect to use this process.

1. Pass an initial aeronautical knowledge test administered at a KTC (see paragraph 6.6).
2. Complete the Remote Pilot Certificate and/or Rating Application for a remote pilot certificate (FAA Form 8710-13).
    - **Option 1 (Online Form):** This is the fastest and simplest method. The FAA Form 8710-13 application should be completed online using the electronic FAA Integrated Airmen Certificate and/or Rating Application (IACRA) system

(https://iacra.faa.gov/iacra/). The applicant must have already passed an initial aeronautical knowledge test. Once registered with IACRA, he or she will login with their username and password. Click on "Start New Application" and, 1) Application Type "Pilot", 2) Certifications "Remote Pilot," 3) "Other Path Information," and 4) "Start Application." Continue through the application process and, when prompted, the applicant will enter the 17-digit Knowledge Test Exam ID from the knowledge test in IACRA. It may take up to 48 hours from the test date for the knowledge test to appear in IACRA. The KTC test proctor will be the one that verified the identity of the applicant. Once the applicant completes the online application in IACRA, he or she will sign the application electronically and submit it to the Airman Registry for processing. No FAA representative will be required to sign the application if the applicant was able to self-certify.

Note: When the applicant uses this online option, the application will be transmitted electronically from the applicant to the Airman Registry. The only electronic signature that will be reflected on the IACRA application will be the applicant's. The applicant will then receive a confirmation email once his or her application has completed the Transportation Security Administration (TSA) vetting process. The email will provide information that will allow the applicant to log into the IACRA system and print a copy of the temporary certificate.

- **Option 2 (Paper Application):** An applicant could also submit a paper application. If the applicant chooses the paper method, the original initial aeronautical knowledge test report must be mailed with the application to the following address:

DOT/FAA
Airmen Certification Branch (AFS-760)
P.O. Box 25082
Oklahoma City, OK 73125

Note: A temporary airman certificate will not be provided to the remote pilot applicant if they do not hold a part 61 certificate. For this reason, it would be of the applicant's best interest to utilize Option 1 (IACRA system) instead of the paper method, in order to receive a temporary airman certificate once the application has completed the TSA vetting process.

3. Receive permanent remote pilot certificate once all other FAA internal processing is complete.

6.4.2 Applicants with Part 61 Certificates. Instead of the process described above, a person who holds a part 61 pilot certificate, except a student pilot certificate, and has completed a flight review within the previous 24 calendar-months may elect to apply using the following process:

1. Complete the online course (Part 107 small Unmanned Aircraft Systems (sUAS), ALC-451) located within the FAA Safety Team (FAASTeam) Web site (www.faasafety.gov) and receive a completion certificate.
2. Complete the Remote Pilot Certificate and/or Rating Application for a remote pilot certificate (FAA Form 8710-13).
    - **Option 1 (Online Application):** In almost all cases, the application should be completed online using the electronic FAA IACRA system (https://iacra.faa.gov/iacra/). The applicant must include verification that he or she completed the online course or passed an initial aeronautical knowledge test. The applicable official document(s) must be uploaded into IACRA either by the applicant or the certifying officer.
    - **Option 2 (Paper):** The application may be completed on paper. Using this method, the certificate of completion for the online course or original initial aeronautical knowledge test report must be included with the application. Please note that the processing time will be increased if a paper application is used.
3. Contact a FSDO, an FAA DPE, an ACR, or an FAA CFI to make an appointment to validate the applicant's identification. The applicant must present the completed FAA Form 8710-13 along with the online course completion certificate or knowledge test report (as applicable) and proof of a current flight review. The FAA Form 8710-13 application will be signed by the applicant after the FSDO, DPE, ACR, or CFI examines the applicant's photo identification and verifies the applicant's identity. The FAA representative will then sign the application. The identification presented must include a photograph of the applicant, the applicant's signature, and the applicant's actual residential address (if different from the mailing address). This information may be presented in more than one form of identification. Acceptable methods of identification include, but are not limited to U.S. drivers' licenses, government identification cards, passports, and military identification cards (refer to AC 61-65). If using paper or IACRA method, an appropriate FSDO representative, a DPE, or an ACR will issue the applicant a temporary airman certificate.

    Note: A CFI is not authorized to issue a temporary certificate. They can process applications for applicants who do not need a temporary certificate. If using IACRA and the applicant is utilizing a CFI as the FAA representative, the applicant can print their own temporary airman certificate after receiving an email from the FAA notifying them that it is available. If using the paper method and the applicant is utilizing a CFI as the FAA representative, the applicant will not be issued a temporary airman certificate. Once the FSDO has signed and approved the application, it will be mailed to the Registry for the issuance of the permanent certificate.

4. Receive permanent remote pilot certificate once all other FAA internal processing is complete.

6.5 Security Disqualification. After the FAA receives the application, the TSA will automatically conduct a background security screening of the applicant prior to issuance of a remote pilot certificate. If the security screening is successful, the FAA will issue a permanent remote pilot certificate. If the security screening is not successful, the applicant will be disqualified and a temporary pilot certificate will not be issued. Individuals who believe that they improperly failed a security threat assessment may appeal the decision to the TSA.

6.6 Aeronautical Knowledge Tests (Initial and Recurrent). It is important to have and retain the knowledge necessary to operate a small UA in the NAS. This aeronautical knowledge can be obtained through self-study, taking an online training course, taking an in-person training course, or any combination thereof. The FAA has published the Small Unmanned Aircraft Systems Airman Certification Standard (https://www.faa.gov/training_testing/testing/acs/) that provides the necessary reference material.

> **Note:** The below information regarding initial and recurrent knowledge tests apply to persons who do not hold a current part 61 airman certificate.

6.6.1 Initial Test. As described in paragraph 6.4, a person applying for remote pilot certificate with an sUAS rating must pass an initial aeronautical knowledge test given by an FAA-approved KTC. The initial knowledge test will cover the aeronautical knowledge areas listed below:

1. Applicable regulations relating to sUAS rating privileges, limitations, and flight operation;
2. Airspace classification and operating requirements, and flight restrictions affecting small UA operation;
3. Aviation weather sources and effects of weather on small UA performance;
4. Small UA loading and performance;
5. Emergency procedures;
6. Crew Resource Management (CRM);
7. Radio communication procedures;
8. Determining the performance of small UA;
9. Physiological effects of drugs and alcohol;
10. Aeronautical decision-making (ADM) and judgment;
11. Airport operations; and
12. Maintenance and preflight inspection procedures.

6.6.1.1 A part 61 certificate holder who has completed a flight review within the previous 24 calendar-months may complete an initial online training course instead of taking the knowledge test (see paragraph 6.7).

6.6.1.2 Additional information on some of the knowledge areas listed above can be found in Appendix B.

6.6.2 Recurrent Test. After a person receives a remote pilot certificate with an sUAS rating, that person must retain and periodically update the required aeronautical knowledge to continue to operate a small UA in the NAS. To continue exercising the privileges of a remote pilot certificate, the certificate holder must pass a recurrent aeronautical knowledge test within 24 calendar-months of passing either an initial or recurrent aeronautical knowledge test. A part 61 pilot certificate holder who has completed a flight review within the previous 24 calendar-months may complete a recurrent online training course instead of taking the knowledge test.

6.6.2.1 Figure 6-1, Recurrent Test Cycle Examples, illustrates an individual's possible renewal cycles.

Figure 6-1. Recurrent Test Cycle Examples

Person passes an initial aeronautical knowledge test on September 13, 2016.	then	Recurrent knowledge test must be passed no later than September 30, 2018, which does not exceed 24 calendar-months.
Person does not pass recurrent knowledge test until October 5, 2018.	then	Person may not exercise the privileges of the remote pilot certificate between October 1, 2018, and October 5, 2018, when the test is passed. The next recurrent knowledge test must be passed no later than October 31, 2020, which does not exceed 24 calendar-months.
Person elects to take recurrent knowledge test prior to October 2020. The recurrent knowledge test is taken and passed on July 15, 2020.	then	The next recurrent knowledge test must be passed no later than July 31, 2022, which does not exceed 24 calendar-months.

6.6.2.2 The recurrent aeronautical knowledge test areas are as follows:

1. Applicable regulations relating to sUAS rating privileges, limitations, and flight operation;
2. Airspace classification and operating requirements and flight restrictions affecting small UA operation;
3. Emergency procedures;
4. CRM;
5. ADM and judgment;

6. Airport operations; and
7. Maintenance and preflight inspection procedures.

6.6.3 Test Providers. KTCs will administer initial and recurrent examinations provided by the FAA. In order to take an aeronautical knowledge test, an applicant will be required to schedule an appointment with the KTC providing proper government-issued photo identification to the KTC on the day of scheduled testing. The location of the closest KTC can be found at http://www.faa.gov/training_testing/testing/media/test_centers.pdf.

6.7 Aeronautical Knowledge Training Course (Initial and Recurrent). This section is applicable only to persons who hold a part 61 airman certificate, other than a student pilot certificate, and have a current flight review.

6.7.1 Initial Training Course. As described in paragraph 6.4, a pilot applying for a remote pilot certificate may complete an initial training course instead of the knowledge test. The training course can be taken online at www.faasafety.gov. The initial training course will cover the aeronautical knowledge areas listed below:

1. Applicable regulations relating to sUAS rating privileges, limitations, and flight operation;
2. Effects of weather on small UA performance;
3. Small UA loading and performance;
4. Emergency procedures;
5. CRM;
6. Determining the performance of small UA; and
7. Maintenance and preflight inspection procedures.

Note: Additional information on some of the knowledge areas listed above can be found in Appendix B.

6.7.2 Recurrent Training Course. After a pilot receives a remote pilot certificate with an sUAS rating, that person must retain and periodically update the required aeronautical knowledge to continue to operate a small UA in the NAS. As a renewal process, the remote pilot must complete either a recurrent training course or a recurrent knowledge test within 24 calendar-months of passing either an initial or recurrent aeronautical knowledge test. Figure 6-2, Recurrent Training Course Cycle Examples, illustrates an individual's possible renewal cycles.

Figure 6-2. Recurrent Training Course Cycle Examples

Person passes an initial aeronautical knowledge test on September 13, 2016.	then	Recurrent training course must be completed no later than September 30, 2018, which does not exceed 24 calendar-months.
Person does not complete recurrent training course until October 5, 2018.	then	Person may not exercise the privileges of the remote pilot certificate between October 1, 2018, and October 5, 2018, when the course is completed. The next recurrent training course must be completed no later than October 31, 2020, which does not exceed 24 calendar-months.
Person elects to complete recurrent training course prior to October 2020. The recurrent training course is taken and completed on July 15, 2020.	then	The next recurrent training course must be completed no later than July 31, 2022, which does not exceed 24 calendar-months.

6.7.2.1 The recurrent training course areas are as follows:

1. Applicable regulations relating to sUAS rating privileges, limitations, and flight operation;
2. Emergency procedures;
3. CRM; and
4. Maintenance and preflight inspection procedures.

CHAPTER 7. sUAS MAINTENANCE AND INSPECTION

7.1 Applicability. Section 107.15 requires the remote PIC to perform checks of the UA prior to each flight to determine if the sUAS is in a condition for safe operation. This chapter provides guidance on how to inspect and maintain an sUAS. Additionally, Appendix C, sUAS Maintenance and Inspection Best Practices, contains expanded information and best practices for sUAS maintenance and inspection.

7.2 Maintenance. sUAS maintenance includes scheduled and unscheduled overhaul, repair, inspection, modification, replacement, and system software upgrades of the sUAS and its components necessary for flight. Whenever possible, the operator should maintain the sUAS and its components in accordance with manufacturer's instructions. The aircraft manufacturer may provide the maintenance program, or, if one is not provided, the applicant may choose to develop one. See paragraph 7.3.5 for suggested benefits of recordkeeping.

7.2.1 Scheduled Maintenance. The sUAS manufacturer may provide documentation for scheduled maintenance of the entire UA and associated system equipment. There may be components of the sUAS that are identified by the manufacturer to undergo scheduled periodic maintenance or replacement based on time-in-service limits (such as flight hours, cycles, and/or the calendar-days). All manufacturer scheduled maintenance instructions should be followed in the interest of achieving the longest and safest service life of the sUAS.

7.2.1.1 If there are no scheduled maintenance instructions provided by the sUAS manufacturer or component manufacturer, the operator should establish a scheduled maintenance protocol. This could be done by documenting any repair, modification, overhaul, or replacement of a system component resulting from normal flight operations, and recording the time-in-service for that component at the time of the maintenance procedure. Over time, the operator should then be able to establish a reliable maintenance schedule for the sUAS and its components.

7.2.2 Unscheduled Maintenance. During the course of a preflight inspection, the remote PIC may discover that an sUAS component is in need of servicing (such as lubrication), repair, modification, overhaul, or replacement outside of the scheduled maintenance period as a result of normal flight operations or resulting from a mishap. In addition, the sUAS manufacturer or component manufacture may require an unscheduled system software update to correct a problem. In the event such a condition is found, the remote PIC should not conduct flight operations until the discrepancy is corrected.

7.2.3 Performing Maintenance. In some instances, the sUAS or component manufacturer may require certain maintenance tasks be performed by the manufacturer or by a person or facility (personnel) specified by the manufacturer. It is highly recommended that the maintenance be performed in accordance with the manufacturer's instructions. However, if the operator decides not to use the manufacturer or personnel recommended by the manufacturer and is unable to perform the required maintenance, the operator should

consider the expertise of maintenance personnel familiar with the specific sUAS and its components. In addition, though not required, the use of certificated maintenance providers are encouraged, which may include repair stations, holders of mechanic and repairman certificates, and persons working under the supervision of these mechanics and repairman.

7.2.3.1 If the operator or other maintenance personnel are unable to repair, modify, or overhaul an sUAS or component back to its safe operational specification, then it is advisable to replace the sUAS or component with one that is in a condition for safe operation. It is important that all required maintenance be completed before each flight, and preferably in accordance with the manufacturer's instructions or, in lieu of that, within known industry best practices.

7.3 Preflight Inspection. Before each flight, the remote PIC must inspect the sUAS to ensure that it is in a condition for safe operation, such as inspecting for equipment damage or malfunction(s). The preflight inspection should be conducted in accordance with the sUAS manufacturer's inspection procedures when available (usually found in the manufacturer's owner or maintenance manual) and/or an inspection procedure developed by the sUAS owner or operator.

7.3.1 Creating an Inspection Program. As an option, the sUAS owner or operator may wish to create an inspection program for their UAS. The person creating an inspection program for a specific sUAS may find sufficient details to assist in the development of a suitable inspection program tailored to a specific sUAS in a variety of industry programs.

7.3.2 Scalable Preflight Inspection. The preflight check as part of the inspection program should include an appropriate UAS preflight inspection that is scalable to the UAS, program, and operation to be performed prior to each flight. An appropriate preflight inspection should encompass the entire system in order to determine a continued condition for safe operation prior to flight.

7.3.3 Title 14 CFR Part 43 Appendix D Guidelines. Another option and best practice may include the applicable portions of part 43 appendix D as an inspection guideline correlating to the UA only. System-related equipment, such as, but not limited to, the CS, data link, payload, or support equipment, are not included in the list in appendix D. Therefore, these items should be included in a comprehensive inspection program for the UAS.

7.3.4 Preflight Inspection Items. Even if the sUAS manufacturer has a written preflight inspection procedure, it is recommended that the remote PIC ensure that the following inspection items are incorporated into the preflight inspection procedure required by part 107 to help the remote PIC determine that the sUAS is in a condition for safe operation. The preflight inspection should include a visual or functional check of the following items:

1. Visual condition inspection of the UAS components;
2. Airframe structure (including undercarriage), all flight control surfaces, and linkages;
3. Registration markings, for proper display and legibility;
4. Moveable control surface(s), including airframe attachment point(s);
5. Servo motor(s), including attachment point(s);
6. Propulsion system, including powerplant(s), propeller(s), rotor(s), ducted fan(s), etc.;
7. Verify all systems (e.g., aircraft and control unit) have an adequate energy supply for the intended operation and are functioning properly;
8. Avionics, including control link transceiver, communication/navigation equipment, and antenna(s);
9. Calibrate UAS compass prior to any flight;
10. Control link transceiver, communication/navigation data link transceiver, and antenna(s);
11. Display panel, if used, is functioning properly;
12. Check ground support equipment, including takeoff and landing systems, for proper operation;
13. Check that control link correct functionality is established between the aircraft and the CS;
14. Check for correct movement of control surfaces using the CS;
15. Check onboard navigation and communication data links;
16. Check flight termination system, if installed;
17. Check fuel for correct type and quantity;
18. Check battery levels for the aircraft and CS;
19. Check that any equipment, such as a camera, is securely attached;
20. Verify communication with UAS and that the UAS has acquired GPS location from at least four satellites;
21. Start the UAS propellers to inspect for any imbalance or irregular operation;
22. Verify all controller operation for heading and altitude;
23. If required by flight path walk through, verify any noted obstructions that may interfere with the UAS; and
24. At a controlled low altitude, fly within range of any interference and recheck all controls and stability.

7.3.5 Benefits of Recordkeeping. sUAS owners and operators may find recordkeeping to be beneficial. This could be done by documenting any repair, modification, overhaul, or replacement of a system component resulting from normal flight operations, and recording the time-in-service for that component at the time of the maintenance procedure. Over time, the operator should then be able to establish a reliable maintenance schedule for the sUAS and its components. Recordkeeping that includes a record of all periodic inspections, maintenance, preventative maintenance, repairs, and alterations performed on the sUAS could be retrievable from either hardcopy and/or electronic logbook format for future reference. This includes all components of the sUAS, including: small UA, CS, launch and recovery equipment, C2 link equipment, payload, and any other components required to safely operate the sUAS. Recordkeeping of documented maintenance and inspection events reinforces owner/operator responsibilities for airworthiness through systematic condition for safe flight determinations. Maintenance and inspection recordkeeping provides retrievable empirical evidence of vital safety assessment data defining the condition of safety-critical systems and components supporting the decision to launch. Recordkeeping of an sUAS may provide essential safety support for commercial operators that may experience rapidly accumulated flight operational hours/cycles. Methodical maintenance and inspection data collection can prove to be very helpful in the tracking of sUAS component service life, as well as systemic component, equipage, and structural failure events.

APPENDIX A. RISK ASSESSMENT TOOLS

A.1 Purpose of this Appendix. The information in this appendix is a presentation of aeronautical decision-making (ADM), Crew Resource Management (CRM), and an example of a viable risk assessment process. This process is used to identify hazards and classify the potential risk that those hazards could present in an operation. It also provides examples of potential criteria for the severity of consequences and likelihood of occurrence that may be used by an sUAS remote pilot in command (PIC).

A.2 Aeronautical Decision-Making (ADM). The ADM process addresses all aspects of decisionmaking in a solo or crew environment and identifies the steps involved in good decisionmaking. These steps for good decisionmaking are as follows:

A.2.1 Identifying Personal Attitudes Hazardous to Safe Flight. Hazardous attitudes can affect unmanned operations if the remote PIC is not aware of the hazards, leading to such things as: getting behind the aircraft/situation, operating without adequate fuel/battery reserve, loss of positional or situational awareness, operating outside the envelope, and failure to complete all flight planning tasks, preflight inspections, and checklists. Operational pressure is a contributor to becoming subject to these pit-falls.

A.2.2 Learning Behavior Modification Techniques. Continuing to utilize risk assessment procedures for the operation will assist in identifying risk associated with the operation. Conducting an attitude assessment will identify situations where a hazardous attitude may be present.

A.2.3 Learning How to Recognize and Cope with Stress. Stress is ever present in our lives and you may already be familiar with situations that create stress in aviation. However, UAS operations may create stressors that differ from manned aviation. Such examples may include: working with an inexperienced crewmember, lack of standard crewmember training, interacting with the public and city officials, and understanding new regulatory requirements. Proper planning for the operation can reduce or eliminate stress, allowing you to focus more clearly on the operation.

A.2.4 Developing Risk Assessment Skills. As with any aviation operation, identifying associated hazards is the first step. Analyzing the likelihood and severity of the hazards occurring establishes the probability of risk. In most cases, steps can be taken to mitigate, even eliminate, those risks. Actions such as using visual observers (VO), completing a thorough preflight inspection, planning for weather, familiarity with the airspace, proper aircraft loading, and performance planning can mitigate identified risks. Figure A-1, Hazard Identification and Risk Assessment Process Chart, is an example of a risk assessment tool. Others are also available for use.

A.2.5 Using All Available Resources with More Than One Crewmember (CRM). A characteristic of CRM is creating an environment where open communication is encouraged and expected, and involves the entire crew to maximize team performance. Many of the same resources that are available to manned aircraft operations are available to UAS operations. For example, remote PICs can take advantage of traditional CRM

techniques by utilizing additional crewmembers, such as VOs and other ground crew. These crewmembers can provide information about traffic, airspace, weather, equipment, and aircraft loading and performance. Examples of good CRM include:

A.2.5.1 **Communication Procedures**. One way to accomplish this is to have the VO maintain visual contact with the small UA and maintain awareness of the surrounding airspace, and then communicate flight status and any hazards to the remote PIC and person manipulating the controls so that appropriate action can be taken. Then, as conditions change, the remote PIC should brief the crew on the changes and any needed adjustments to ensure a safe outcome of the operation.

A.2.5.2 **Communication Methods**. The remote PIC, person manipulating the controls, and VO must work out a method of communication, such as the use of a hand-held radio or other effective means, that would not create a distraction and allows them to understand each other. The remote PIC should evaluate which method is most appropriate for the operation and should be determined prior to flight.

A.2.5.3 **Task Management.** Tasks very depending on the complexity of the operation. Depending upon the area of the operations, additional crewmembers may be needed to safely operate. Enough crewmembers should be utilized to ensure no one on the team becomes overloaded. Once a member of the team becomes over worked, there's a greater possibility of an incident/accident.

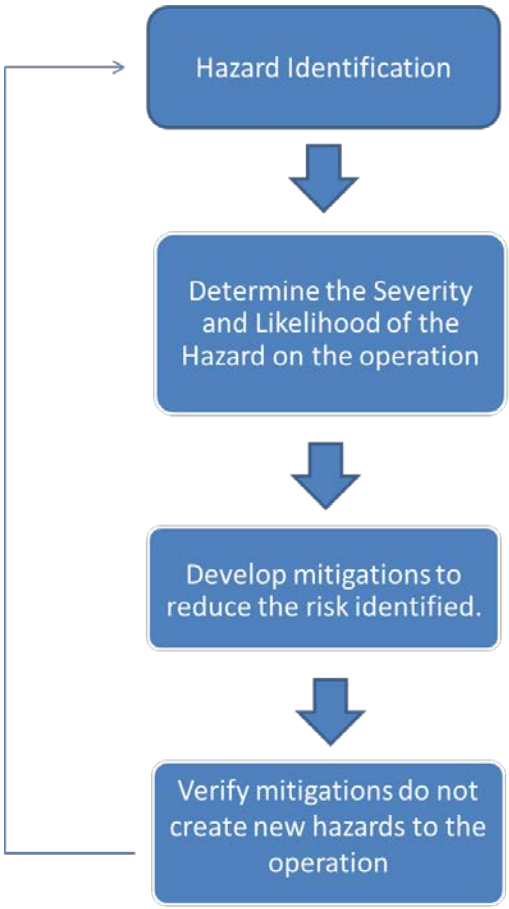
A.2.5.4 **Other Resources**. Take advantage of information from a weather briefing, air traffic control (ATC), the FAA, local pilots, and landowners. Technology can aid in decisionmaking and improve situational awareness. Being able to collect the information from these resources and manage the information is key to situational awareness and could have a positive effect on your decisionmaking.

A.2.6 Evaluating the Effectiveness of One's ADM Skills. Successful decisionmaking is measured by a pilot's consistent ability to keep himself or herself, any persons involved in the operation, and the aircraft in good condition regardless of the conditions of any given flight. As with manned operations, complacency and overconfidence can be risks, and so there are several checklists and models to assist in the decisionmaking process. Use the IMSAFE checklist to ensure you are mentally and physically prepared for the flight. Use the DECIDE model to help you continually evaluate each operation for hazards and analyze risk. Paragraph A.5.5 and the current edition of AC 60-22, Aeronautical Decision Making, can provide additional information on these models and others.

A.3 **Hazard Identification.** Hazards in the sUAS and its operating environment must be identified, documented, and controlled. The analysis process used to define hazards needs to consider all components of the system, based on the equipment being used and the

environment it is being operated in. The key question to ask during analysis of the sUAS and its operation is, "*what if*?" sUAS remote PICs are expected to exercise due diligence in identifying significant and reasonably foreseeable hazards related to their operations.

Figure A-1. Hazard Identification and Risk Assessment Process Chart



A.4 Risk Analysis and Assessment. The risk assessment should use a conventional breakdown of risk by its two components: likelihood of occurrence and severity.

A.5 Severity and Likelihood Criteria. There are several tools which could be utilized in determining severity and likelihood when evaluating a hazard. One tool is a risk matrix. Several examples of these are presented in Figure A-2, Safety Risk Matrix Examples. The definitions and construction of the matrix is left to the sUAS remote PIC to design. The definitions of each level of severity and likelihood need to be defined in terms that are realistic for the operational environment. This ensures each remote PIC's decision tools are relevant to their operations and operational environment, recognizing the extensive diversity which exists. An example of severity and likelihood definitions is shown in Table A-1, Sample Severity and Likelihood Criteria.

Table A-1. Sample Severity and Likelihood Criteria

Severity of Consequences			**Likelihood of Occurrence**		
Severity Level	Definition	Value	Likelihood Level	Definition	Value
Catastrophic	Equipment destroyed, multiple deaths.	5	Frequent	Likely to occur many times	5
Hazardous	Large reduction in safety margins, physical distress, or a workload such that crewmembers cannot be relied upon to perform their tasks accurately or completely. Serious injury or death. Major equipment damage.	4	Occasional	Likely to occur sometimes	4
Major	Significant reduction in safety margins, reduction in the ability of crewmembers to cope with adverse operating conditions as a result of an increase in workload, or as result of conditions impairing their efficiency. Serious incident. Injury to persons.	3	Remote	Unlikely, but possible to occur	3
Minor	Nuisance. Operating limitations. Use of emergency procedures. Minor incident.	2	Improbable	Very unlikely to occur	2
Negligible	Little consequence.	1	Extremely Improbable	Almost inconceivable that the event will occur	1

A.5.1 Risk Acceptance. In the development of risk assessment criteria, sUAS remote PICs are expected to develop risk acceptance procedures, including acceptance criteria and designation of authority and responsibility for risk management decisionmaking. The acceptability of risk can be evaluated using a risk matrix, such as those illustrated in Figure A-2. Table A-2, Safety Risk Matrix—Example shows three areas of acceptability.

Risk matrices may be color coded; unacceptable (red), acceptable (green), and acceptable with mitigation (yellow).

A.5.1.1 Unacceptable (Red). Where combinations of severity and likelihood cause risk to fall into the red area, the risk would be assessed as unacceptable and further work would be required to design an intervention to eliminate that associated hazard or to control the factors that lead to higher risk likelihood or severity.

A.5.1.2 Acceptable (Green). Where the assessed risk falls into the green area, it may be accepted without further action. The objective in risk management should always be to reduce risk to as low as practicable regardless of whether or not the assessment shows that it can be accepted as is.

A.5.1.3 Acceptable with Mitigation (Yellow). Where the risk assessment falls into the yellow area, the risk may be accepted under defined conditions of mitigation. An example of this situation would be an assessment of the impact of an sUAS operation near a school yard. Scheduling the operation to take place when school is not in session could be one mitigation to prevent undue risk to the children that study and play there. Another mitigation could be restricting people from the area of operations by placing cones or security personnel to prevent unauthorized access during the sUAS flight operation.

Figure A-2. Safety Risk Matrix Examples

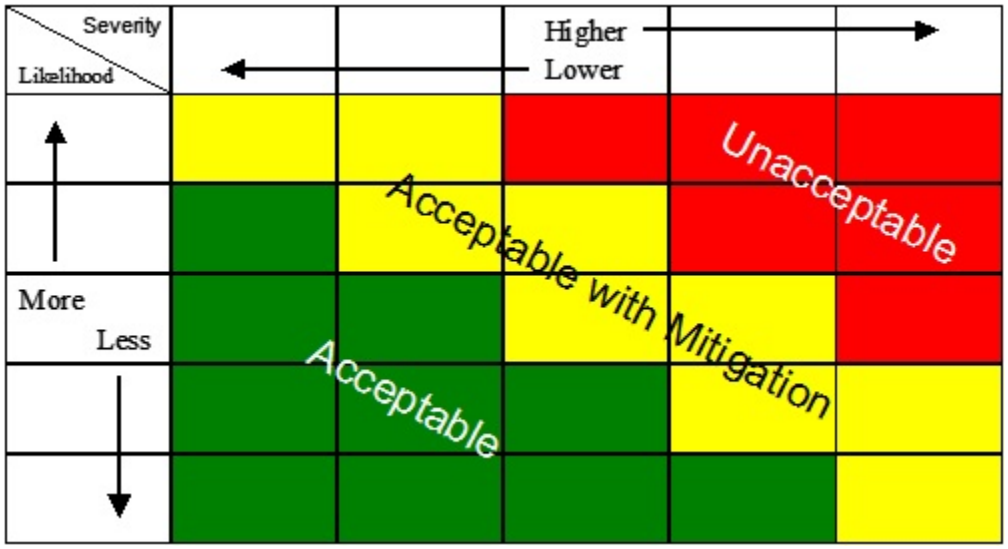


Table A-2. Safety Risk Matrix—Example

Risk Likelihood		Risk Severity				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely Improbable	1	1A	1B	1C	1D	1E

Note: The direction of higher/lower and more/less scales on a matrix is at the discretion of the remote PIC.

A.5.2 Other Risk Assessment Tools for Flight and Operational Risk Management. Other tools can also be used for flight or operational risk assessments and can be developed by the remote PICs themselves. The key thing is to ensure that all potential hazards and risks are identified and appropriate actions are taken to reduce the risk to persons and property not associated with the operations.

A.5.3 Reducing Risk. Risk analyses should concentrate not only on assigning levels of severity and likelihood, but on determining why these particular levels were selected. This is referred to as *root cause analysis*, and is the first step in developing effective controls to reduce risk to lower levels. In many cases, simple brainstorming sessions among crewmembers is the most effective and affordable method of finding ways to reduce risk. This also has the advantage of involving people who will ultimately be required to implement the controls developed.

A.5.3.1 It is also very easy to get quite bogged down in trying to identify all hazards and risks. That is not the purpose of a risk assessment. The focus should be upon those hazards which pose the greatest risks. As stated earlier, by documenting and compiling these processes, a remote PIC can build an arsenal of safety practices that will add to the safety and success of future operations.

A.5.4 Sample Hazard Identification and Risk Assessment.

A.5.4.1 **Example.** I am the remote PIC of an sUAS in the proximity of an accident scene shooting aerial footage. Much like pilots in manned aircraft must adhere to preflight action (part 91, § 91.103), I must adhere to preflight familiarization, inspection, and aircraft operations (§ 107.49). Let's say that there is an obvious takeoff and landing site that I intend to use. What if, while I am operating a manned aircraft (emergency medical services (EMS) helicopter) requires use of the same area and I am not left with a suitable landing site? Furthermore, I am running low on power. If I consider this situation prior to flight, I can use the Basic Hazard Identification and Mitigation Process. Through this process, I might determine that an acceptable level of risk can be achieved by also having an alternate landing site and possibly additional sites at which I can sacrifice the UA to avoid imposing risk to people on the ground or to manned aircraft operations. It is really a simple process: I must consider the hazards presented during this particular operation, determine the risk severity, and then develop a plan to lessen (or mitigate) the risk to an acceptable level. By documenting and compiling these processes, I can build an arsenal of safety practices that will add to the safety and success of future operations. The following are some proven methods that can help a new remote PIC along the way:

A.5.4.2 **Hazard Identification.** Using the Personal Minimums (PAVE) Checklist for Risk Management, I will set personal minimums based upon my specific flight experience, health habits, and tolerance for stress, just to name a few. After identifying hazards, I will then input them into the Hazard Identification and Risk Management Process Chart (Figure A-1).

1. **P**ersonal: Am I healthy for flight and what are my personal minimums based upon my experience operating this sUAS? During this step, I will often use the IMSAFE checklist in order to perform a more in-depth evaluation:
   - **I**llness – Am I suffering from any illness or symptom of an illness which might affect me in flight?
   - **M**edication – Am I currently taking any drugs (prescription or over-the-counter)?
   - **S**tress – Am I experiencing any psychological or emotional factors which might affect my performance?
   - **A**lcohol – Have I consumed alcohol within the last 8 to 24 hours?
   - **F**atigue – Have I received sufficient sleep and rest in the recent past?
   - **E**ating – Am I sufficiently nourished?
2. **A**ircraft: Have I conducted a preflight check of my sUAS (aircraft, control station (CS), takeoff and landing equipment, etc.) and

determined it to be in a condition for safe operation? Is the filming equipment properly secured to the aircraft prior to flight?

3. En**V**iroment: What is the weather like? Am I comfortable and experienced enough to fly in the forecast weather conditions? Have I considered all of my options and left myself an "out?" Have I determined alternative landing spots in case of an emergency?
4. **E**xternal Pressures: Am I stressed or anxious? Is this a flight that will cause me to be stressed or anxious? Is there pressure to complete the flight operation quickly? Am I dealing with an unhealthy safety culture? Am I being honest with myself and others about my personal operational abilities and limitations?

A.5.5 Controlling Risk. After hazards and risks are fully understood through the preceding steps, risk controls must be designed and implemented. These may be additional or changed procedures, additional or modified equipment, the addition of VOs, or any of a number of other changes.

A.5.6 Residual and Substitute Risk. Residual risk is the risk remaining after mitigation has been completed. Often, this is a multistep process, continuing until risk has been mitigated down to an acceptable level necessary to begin or continue operation. After these controls are designed but before the operation begins or continues, an assessment must be made of whether the controls are likely to be effective and/or if they introduce new hazards to the operation. The latter condition, introduction of new hazards, is referred to as substitute risk, a situation where the cure is worse than the disease. The loop seen in Figure A-1 that returns back to the top of the diagram depicts the use of the preceding hazard identification, risk analysis, and risk assessment processes to determine if the modified operation is acceptable.

A.5.7 Starting the Operation. Once appropriate risk controls are developed and implemented, then the operation can begin.

APPENDIX B. SUPPLEMENTAL OPERATIONAL INFORMATION

B.1 Determining Operational Performance. The manufacturer may provide operational and performance information that contains the operational performance data for the aircraft such as data pertaining to takeoff, climb, range, endurance, descent, and landing. To be able to make practical use of the aircraft's capabilities and limitations, it is essential to understand the significance of the operational data. The use of this data in flying operations is essential for safe and efficient operation. It should be emphasized that the manufacturers' information regarding performance data is not standardized. If manufacturer-published performance data is unavailable, it is advisable to seek out performance data that may have already been determined and published by other users of the same sUAS manufacturer model and use that data as a starting point.

B.2 sUAS Loading and Its Effects on Performance.

B.2.1 Weight and Balance (W&B). Before any flight, the remote PIC should verify the aircraft is correctly loaded by determining the W&B condition of the aircraft. An aircraft's W&B restrictions established by the manufacturer or the builder should be closely followed. Compliance with the manufacturer's W&B limits is critical to flight safety. The remote PIC must consider the consequences of an overweight aircraft if an emergency condition arises.

- Although a maximum gross takeoff weight may be specified, the aircraft may not always safely take off with this load under all conditions. Conditions that affect takeoff and climb performance, such as high elevations, high air temperatures, and high humidity (high density altitudes) may require a reduction in weight before flight is attempted. Other factors to consider prior to takeoff are runway/launch area length, surface, slope, surface wind, and the presence of obstacles. These factors may require a reduction in weight prior to flight.
- Weight changes during flight also have a direct effect on aircraft performance. Fuel burn is the most common weight change that takes place during flight. As fuel is used, the aircraft becomes lighter and performance is improved, but this could have a negative effect on balance. In UAS operations, weight change during flight may occur when expendable items are used on board (e.g., a jettisonable load).

B.2.2 Balance, Stability, and Center of Gravity (CG). Adverse balance conditions (i.e., weight distribution) may affect flight characteristics in much the same manner as those mentioned for an excess weight condition. Limits for the location of the CG may be established by the manufacturer. The CG is not a fixed point marked on the aircraft; its location depends on the distribution of aircraft weight. As variable load items are shifted or expended, there may be a resultant shift in CG location. The remote PIC should determine how the CG will shift and the resultant effects on the aircraft. If the CG is not within the allowable limits after loading or do not remain within the allowable limits for safe flight, it will be necessary to relocate or shed some weight before flight is attempted.

B.3 Sources of Weather Information for Small UA Operations. Remote PICs are encouraged to obtain weather information prior to flight from Flight Service by using the Web site www.1800wxbrief.com. Remote PICs can create a free account in order to use the briefing service. While Flight Service does offer a telephone-based service, it is intended for manned aircraft pilots only.

B.3.1 National Weather Service (NWS). Remote PICs are also encouraged to visit the NWS's Aviation Weather Center (AWC) at www.aviationweather.gov. This free, Web-based service does not require registration and offers all of the weather products important to a remote PIC, such as Aviation Routine Weather Reports (METAR) and Terminal Aerodrome Forecast (TAF). While reviewing the weather for your intended operation, it is also critical that the remote PIC review any temporary flight restrictions (TFR) at the FAA's TFR Web site, which can be found at http://tfr.faa.gov.

B.4 Weather and the Effects on Performance. Weather is an important factor that influences aircraft performance and flying safety. Atmospheric pressure and density, wind, and uneven surface heating are factors that affect sUAS performance and must be considered prior to flight.

B.4.1 Wind. Wind speed and direction are important as they affect takeoff, landing, and cruise of flight operations. Geological features, trees, structures, and other anomalies can affect the wind direction and speed close to the ground. In particular, ground topography, trees, and buildings can break up the flow of the wind and create wind gusts that change rapidly in direction and speed. The remote PIC should be vigilant when operating UAS near large buildings or other man-made structures and natural obstructions, such as mountains, bluffs, or canyons. The intensity of the turbulence associated with ground obstructions depends on the size of the obstacle and the primary velocity of the wind. This same condition is even more noticeable when flying in mountainous regions. While the wind flows smoothly up the windward side of the mountain and the upward currents help to carry an aircraft over the peak of the mountain, the wind on the leeward side does not act in a similar manner. As the air flows down the leeward side of the mountain, the air follows the contour of the terrain and is increasingly turbulent. This tends to push an aircraft into the side of a mountain. The stronger the wind, the greater the downward pressure and turbulence become. Due to the effect terrain has on the wind in valleys or canyons, downdrafts can be severe.

B.4.2 Surface Heat. Different surfaces radiate heat in varying amounts. Plowed ground, rocks, sand, and barren land give off a larger amount of heat, whereas water, trees, and other areas of vegetation tend to absorb and retain heat. The resulting uneven heating of the air creates small areas of local circulation called convective currents, which creates bumpy, turbulent air. Convective currents, with their rising and sinking air can adversely affect the controllability of the small UA.

B.5 Battery Fires. Lithium-based batteries are highly flammable and capable of ignition. A battery fire could cause an in-flight emergency by causing a LOC of the small UA. Lithium battery fires can be caused when a battery short circuits, is improperly charged, is heated to extreme temperatures, is damaged as a result of a crash, is mishandled, or is

simply defective. The remote PIC should consider following the manufacturer's recommendations, when available, to help ensure safe battery handling and usage.

B.6 sUAS Frequency Utilization. An sUAS typically uses radio frequencies (RF) for the communication link between the CS and the small UA.

B.6.1 Frequency spectrum (RF) Basics. The 2.4 GHz and 5.8 GHz systems are the unlicensed band RFs that most sUAS use for the connection between the CS and the small UA. Note the frequencies are also used for computer wireless networks and the interference can cause problems when operating a UA in an area (e.g., dense housing and office buildings) that has many wireless signals. LOC and flyaways are some of the reported problems with sUAS frequency implications.

- To avoid frequency interference, many modern sUAS operate using a 5.8 GHz system to control the small UA and a 2.4 GHz system to transmit video and photos to the ground. Consult the sUAS operating manual and manufacturers recommended procedures before conducting sUAS operations.
- It should be noted that both RF bands (2.4 GHz and 5.8 GHz) are considered line of sight and the command and control link between the CS and the small UA will not work properly when barriers are between the CS and the UA. Part 107 requires the remote PIC or person manipulating the controls to be able to see the UA at all times, which should also help prevent obstructions from interfering with the line of sight frequency spectrum.

B.6.2 Spectrum Authorization. Frequency spectrum used for small UA operations are regulated by the Federal Communications Commission (FCC). Radio transmissions, such as those used to control a UA and to downlink real-time video, must use frequency bands that are approved for use by the operating agency. The FCC authorizes civil operations. Some operating frequencies are unlicensed and can be used freely (e.g., 900 MHz, 2.4 GHz, and 5.8 GHz) without FCC approval. All other frequencies require a user-specific license for all civil users, except federal agencies, to be obtained from the FCC. For further information, visit https://www.fcc.gov/licensing-databases/licensing.

APPENDIX C. sUAS MAINTENANCE AND INSPECTION BEST PRACTICES

C.1 In the interest of assisting varying background levels of sUAS knowledge and skill, below is a chart offering conditions that, if noticed during a preflight inspection or check, may support a determination that the UAS is not in a condition for safe operation. Further inspection to identify the scope of damage and extent of possible repair needed to remedy the unsafe condition may be necessary prior to flight.

Table C-1. sUAS Condition Chart

Conditions that may be found may include, but are not limited to, the following:

Condition	Action
1. Structural or skin cracking	Further inspect to determine scope of damage and existence of possible hidden damage that may compromise structural integrity. Assess the need and extent of repairs that may be needed for continued safe flight operations.
2. Delamination of bonded surfaces	Further inspect to determine scope of damage and existence of possible hidden damage that may compromise structural integrity. Assess the need and extent of repairs that may be needed for continued safe flight operations.
3. Liquid or gel leakage	Further inspect to determine source of the leakage. This condition may pose a risk of fire resulting in extreme heat negatively impacting aircraft structures, aircraft performance characteristics, and flight duration. Assess the need and extent of repairs that may be needed for continued safe flight operations.
4. Strong fuel smell	Further inspect to determine source of the smell. Leakage exiting the aircraft may be present and/or accumulating within a sealed compartment. This condition may pose a risk of fire resulting in extreme heat negatively impacting aircraft structures, aircraft performance characteristics, and flight duration. Assess the need and extent of repairs that may be needed for continued safe flight operations.
5. Smell of electrical burning or arcing	Further inspect to determine source of the possible electrical malfunction. An electrical hazard may pose a risk of fire or extreme heat negatively impacting aircraft structures,

	aircraft performance characteristics, and flight duration. Assess the need and extent of repairs that may be needed for continued safe flight operations.
6. Visual indications of electrical burning or arcing (black soot tracings, sparking)	Further inspect to determine source of the possible electrical malfunction. An electrical hazard may pose a risk of fire or extreme heat negatively impacting aircraft structures, aircraft performance characteristics, and flight duration. Assess the need and extent of repairs that may be needed for continued safe flight operations.
7. Noticeable sound (decibel) change during operation by the propulsion system	Further inspect entire aircraft with emphasis on the propulsion system components (i.e., motors and propellers) for damage and/or diminished performance. Assess the need and extent of repairs that may be needed for continued safe flight operations.
8. Control inputs not synchronized or delayed	Discontinue flight and/or avoid further flight operations until further inspection and testing of the control link between the ground control unit and the aircraft. Ensure accurate control communications are established and reliable prior to further flight to circumvent possible loss of control resulting in the risk of a collision or flyaway. Assess the need and extent of repairs that may be needed for continued safe flight operations.
9. Battery casing distorted (bulging)	Further inspect to determine integrity of the battery as a reliable power source. Distorted battery casings may indicate impending failure resulting in abrupt power loss and/or explosion. An electrical hazard may be present, posing a risk of fire or extreme heat negatively impacting aircraft structures, aircraft performance characteristics, and flight duration. Assess the need and extent of repairs that may be needed for continued safe flight operations.
10. Diminishing flight time capability (electric powered propulsion systems)	Further inspect to determine integrity of the battery as a reliable power source. Diminishing battery capacity may indicate impending failure due to exhausted service life, internal, or external damage. An electrical hazard may

	be present, posing a risk of fire or extreme heat negatively impacting aircraft structures, aircraft performance characteristics, and flight duration. Assess the need and extent of repairs that may be needed for continued safe flight operations.
11. Loose or missing hardware/fasteners	Further inspect to determine structural integrity of the aircraft and/or components with loose or missing hardware/fasteners. Loose or missing hardware/fasteners may pose a risk of negatively impacting flight characteristics, structural failure of the aircraft, dropped objects, loss of the aircraft, and risk to persons and property on the grounds. For continued safe flight operations, secure loose hardware/fasteners. Replace loose hardware/fasteners that cannot be secured. Replace missing hardware/fasteners.

Advisory Circular Feedback Form

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by contacting the General Aviation and Commercial Division (AFS-800) at 9-AFS-800-Correspondence@faa.gov or the Flight Standards Directives Management Officer.

Subject: AC 107-2, Small Unmanned Aircraft Systems (sUAS)

Date: _____

Please check all appropriate line items:

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page _____ be changed as follows:

_____

_____

☐ In a future change to this AC, please cover the following subject:
(Briefly describe what you want added.)

_____

_____

☐ Other comments:

_____

_____

☐ I would like to discuss the above. Please contact me.

Submitted by: _____ Date: _____

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF KENTUCKY
LOUISVILLE DIVISION
Electronically filed

JOHN DAVID BOGGS,	)	
	)	
Plaintiff,	)	
	)	
v.	)	**Case No.** 3:16-cv-6-DJH
	)	
WILLIAM H. MERIDETH,	)	
	)	
Defendant.	)	

COMPLAINT FOR DECLARATORY JUDGMENT AND DAMAGES

For his Complaint for Declaratory Judgment and Damages against Defendant, Plaintiff, John David Boggs, alleges the following:

INTRODUCTION

This case involves the intentional downing of Plaintiff's unmanned aircraft by Defendant. Plaintiff was flying his aircraft within Class G airspace and was neither trespassing nor invading anyone's privacy. Defendant has argued to the media and the courts that he was justified in using physical force to prevent what he perceived as an invasion of privacy and trespass upon his property. A state district court judge, dismissing criminal charges against Defendant, ruled that Defendant acted "within his rights." This turn of events has set the stage for a conflict between state-based claims of trespass to property, invasion of privacy, and trespass to chattles and long standing exclusive federal jurisdiction over the national airspace and the protection of air safety. The tension between private property rights and right to traverse safely the national airspace was resolved during the formative days of manned aviation. The issue is now arising in the context of unmanned aircraft, also known as "drones." Plaintiff seeks a declaratory judgment from this

Court to resolve that tension and define clearly the rights of aircraft operators and property owners.

PARTIES

1. Plaintiff, John David Boggs, is a resident of Bullitt County Kentucky.

2. Defendant, William H. Merideth, is a resident of Bullitt County Kentucky.

JURISDICTION AND VENUE

3. This is an action for a declaratory judgment, pursuant to 28 U.S.C. § 2201, for the purpose of determining a question of actual controversy between the parties as more fully appears below. This Court has subject matter jurisdiction pursuant to 28 U.S.C. § 1331 because this action involves issues arising from the laws of the United States. The supplementary state law claims underlying this case implicate significant federal issues. More specifically, plaintiff's right to relief as well as the defendant's defenses, will necessarily require resolution of a substantial question of federal law, to wit, the boundaries of the airspace surrounding real property, the reasonable expectation of privacy as viewed from the air, and the right to damage or destroy an aircraft in-flight, in relation to the exclusive federal regulation and protection of air safety, air navigation, and control over the national airspace.

The Court has supplementary jurisdiction over Plaintiff's claim arising under state law, pursuant to 28 U.S.C. § 1367, because that claim is part of the same case or controversy.

4. Venue is proper in this Court, pursuant to 28 U.S.C. § 1391, because a substantial part of the events or omissions giving rise to the claim occurred in this District.

FACTUAL ALLEGATIONS

5. The Federal Aviation Administration ("FAA") has the exclusive authority to govern airspace within the United States and the operation of aircraft. The federal government's

interest in regulating aviation is paramount. Federal statutes and regulations, including the Transportation Laws of the United States, 49 U.S.C.A. § 40101 *et seq*., and the Airline Deregulation Act, 49 U.S.C.A. § 41713, and the regulations promulgated by the Federal Aviation Administration pursuant to those laws, preempt state law in that area.

6. The FAA's airspace designations state that Class G airspace includes uncontrolled airspace that does not fall within any other classification between the surface and any overlying Class E airspace. Class G airspace is part of the navigable airspace the regulation of which substantially affects interstate commerce.

7. The FAA defines an "aircraft" as "a device that is used or intended to be used for flight in the air." 14 C.F.R. § 1.1.

8. On July 26, 2015, Plaintiff was operating by wireless controller an unmanned aircraft (also referred to as a "drone") at an altitude of approximately 200 feet above ground level in Class G airspace over Bullitt County, Kentucky.

10. Plaintiff's aircraft contained an onboard camera capable of recording video and still photographs. Plaintiff's aircraft recorded video of the horizon, woods and the rooftops of various houses. At no time was Plaintiff capturing video or still images of Defendant or anyone on his property. Below is the last image recorded by the aircraft prior to being shot by Defendant:

11. After approximately two minutes of flight, Defendant shot Plaintiff's unmanned aircraft down with a shotgun, resulting in damage to Plaintiff's property. Defendant later alleged that Plaintiff's unmanned aircraft may have been taking video or still images of Defendant's daughter while hovering over Plaintiff's property, thus Defendant asserts he was protecting his family's privacy rights and preventing further trespass.

12. Defendant was charged by Kentucky authorities with felony wanton endangerment and criminal mischief. On October 26, 2015, Kentucky District Court Judge Rebecca Ward dismissed the criminal charges against Defendant saying that Defendant "had a right to shoot" at the aircraft.

13. Defendant, using the nickname "The Drone Slayer," continues to assert that he was justified in shooting Plaintiff's aircraft and vows to do it again, as evidenced by his Facebook page:

https://www.facebook.com/william.merideth.7

14. Indeed, Defendant has implicitly encouraged others to engage in the same conduct by selling shirts depicted below:

15. Given the foregoing, Plaintiff requests a declaratory judgment, as set forth in more detail below.

FIRST CLAIM FOR RELIEF
(Declaratory Judgment)

16. Plaintiff incorporates by reference the allegations in the foregoing paragraphs as though fully set forth.

17. An actual controversy has arisen and now exists between Plaintiff and Defendant concerning their respective rights and obligations with respect to the damage caused to Plaintiff's aircraft by Defendant.

18. The United States Government has exclusive sovereignty over airspace of the United States pursuant to 49 U.S.C.A. § 40103. The airspace, therefore, is not subject to private ownership nor can the flight of an aircraft within the navigable airspace of the United States constitute a trespass. Unmanned aircraft are aircraft consistent with Subtitle B of Public Law

112-95 and the existing definition of aircraft in Title 49 of the United States Code, 49 U.S.C. 40102.

19. In addition, even if Plaintiff had viewed the defendant's property from the air, which he did not, such viewing would not violate the defendant's reasonable expectation of privacy according to well established federal law. The U.S. Supreme Court has determined, as a general rule, that there is no reasonable expectation of privacy in the area surrounding a home in plain view from above. *California v. Ciraolo,* 476 U.S. 207, 106 S.Ct. 1809, 90 L.Ed.2d 210 (1986); *Florida v. Riley,* 488 U.S. 445, 109 S.Ct. 693, 102 L.Ed.2d 835 (1989) (plurality opinion). Resolution of the current dispute between Plaintiff and Defendant requires the application of this existing federal case law to an as yet unexamined technology – unmanned aircraft.

20. Further, Congress has indicated its unambiguous intent to ensure the safety of aircraft. Pursuant to 18 U.S.C.A. § 32, whoever "sets fire to, damages, destroys, disables, or wrecks any aircraft in the special aircraft jurisdiction of the United States or any civil aircraft used, operated, or employed in interstate, overseas, or foreign air commerce" commits a felony. Although this statute may not create a private right of action, the interpretation of the statute is critical to the determination of the claims asserted herein. Should the court determine that this statute applies to unmanned aircraft, as it should, that would leave no room for Defendant's assertion of the right to self-help or the Kentucky District Court Judge's ruling that Defendant was "within his rights" to shoot the aircraft.

21. Conversely, Kentucky law regarding trespass does not specifically address the rights of unmanned aircraft to traverse the skies above private property. It defines a trespasser as "any person who enters or goes upon the real estate of another without any right, lawful authority

or invitation, either expressed or implied." Ky. Rev. Stat. Ann. § 381.231. A trespasser may be subject to civil suit and/or criminal prosecution. Kentucky law also permits resort to self-help in response to trespass. A landowner may use physical force "upon another person when the person believes that such force is immediately necessary to prevent the commission of criminal trespass." Ky. Rev. Stat. Ann. § 503.080.

22. Given the clear conflict of federal and state laws, as applied to the facts of this action, Plaintiff desires a judicial determination of the respective rights and duties of Plaintiff and Defendant with respect to Plaintiff's rights to operate an aircraft within Class G airspace and recover damages for trespass to chattel caused by Defendant's intentional shooting of that aircraft.

23. Plaintiff is, herein, asserting a claim for trespass to chattels as a result of the damages to his aircraft.

24. The ruling of the Kentucky District Court and assertions made by Defendant regarding his belief that his actions were justified because Plaintiff was engaged in trespass and invasion of privacy are in direct conflict with established federal law governing the regulation of manned aircraft and airways and cannot be resolved without addressing how this law applies to unmanned aircraft

25. For those reasons, Plaintiff seeks the following declaratory judgment:

(A) An unmanned aircraft is an "aircraft" according to Federal law.

(B) An unmanned aircraft operating in Class G airspace in the manner alleged above is operating in "navigable airspace" within the exclusive jurisdiction of the United States.

(C) That Plaintiff was operating his unmanned aircraft in the navigable airspace within the exclusive jurisdiction of the United States and not within Defendant's property;

(D) That the operation of his unmanned aircraft in in the manner alleged above did not violate the defendant's reasonable expectation of privacy; and

(E) That a property owner cannot shoot at an unmanned aircraft operating in navigable airspace within the exclusive jurisdiction of the United States when that aircraft is operating in the manner alleged above.

SECOND CLAIM FOR RELIEF
(Trespass to Chattels)

26. Plaintiff incorporates by reference the allegations in the foregoing paragraphs as though fully set forth.

27. Defendant intentionally intermeddled with personal property in the possession of Plaintiff, specifically, his unmanned aircraft.

28. Defendant impaired the property as to its condition, quality, to value.

29. Plaintiff's property was damaged by the reduced value, condition and quality of his aircraft in an amount of approximately $1,500.00.

WHEREFORE, premises considered, Plaintiff demands the following relief:

1. That the Defendant be served with process and answer the allegations and claims set forth above;

2. That the court enter the declaratory judgment requested in the First Cause of Action, above; and

3. That the Court award to the Plaintiff such other legal and equitable relief as it deems appropriate, including monetary damages, prejudgment interest, and the costs of filing this action.

Respectfully submitted,

s/ Thomas C. Gleason
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Attorneys for Plaintiff

PL 112-95, February 14, 2012, 126 Stat 11

UNITED STATES PUBLIC LAWS

112th Congress - Second Session

Convening January 04, 2012

Additions and Deletions are not identified in this database.
Vetoed provisions within tabular material are not displayed
Vetoes are indicated by ~~Text~~ ;
stricken material by ~~**Text**~~ .

PL 112–95 [HR 658]
February 14, 2012
FAA MODERNIZATION AND REFORM ACT OF 2012

An Act To amend title 49, United States Code, to authorize appropriations for the Federal Aviation Administration for fiscal years 2011 through 2014, to streamline programs, create efficiencies, reduce waste, and improve aviation safety and capacity, to provide stable funding for the national aviation system, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

<< 49 USCA § 40101 NOTE >>

(a) SHORT TITLE.—This Act may be cited as the "FAA Modernization and Reform Act of 2012".

(b) TABLE OF CONTENTS.—The table of contents for this Act is as follows:

(iii) allow for an expedited appeal if the application is disapproved;

(B) allow for a one-time approval of similar operations carried out during a fixed period of time; and

(C) allow a government public safety agency to operate unmanned aircraft weighing 4.4 pounds or less, if operated—

(i) within the line of sight of the operator;

(ii) less than 400 feet above the ground;

(iii) during daylight conditions;

(iv) within Class G airspace; and

(v) outside of 5 statute miles from any airport, heliport, seaplane base, spaceport, or other location with aviation activities.

<< 49 USCA § 40101 NOTE >>

SEC. 335. SAFETY STUDIES.

The Administrator of the Federal Aviation Administration shall carry out all safety studies necessary to support the integration of unmanned aircraft systems into the national airspace system.

<< 49 USCA § 40101 NOTE >>

SEC. 336. SPECIAL RULE FOR MODEL AIRCRAFT.

(a) IN GENERAL.—Notwithstanding any other provision of law relating to the incorporation of unmanned aircraft systems into Federal Aviation Administration plans and policies, including this subtitle, the Administrator of the Federal

Aviation Administration may not promulgate any rule or regulation regarding a model aircraft, or an aircraft being developed as a model aircraft, if—

(1) the aircraft is flown strictly for hobby or recreational use;

(2) the aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization;

(3) the aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;

(4) the aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and

(5) when flown within 5 miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport) with prior notice of the operation (model aircraft operators flying from a permanent location within 5 miles of an airport should establish a mutually-agreed upon operating procedure with the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport)).

(b) STATUTORY CONSTRUCTION.—Nothing in this section shall be construed to limit the authority of the Administrator to pursue enforcement action against persons operating model aircraft who endanger the safety of the national airspace system.

(c) MODEL AIRCRAFT DEFINED.—In this section, the term "model aircraft" means an unmanned aircraft that is—

(1) capable of sustained flight in the atmosphere;
***78**

(2) flown within visual line of sight of the person operating the aircraft; and

(3) flown for hobby or recreational purposes.

Subtitle C—Safety and Protections

SEC. 341. AVIATION SAFETY WHISTLEBLOWER INVESTIGATION OFFICE.

Section 106 (as amended by this Act) is further amended by adding at the end the following:

<< 49 USCA § 106 >>

"(t) AVIATION SAFETY WHISTLEBLOWER INVESTIGATION OFFICE.—

79 FR 36172-01, 2014 WL 2859894(F.R.)
RULES and REGULATIONS
DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
14 CFR Part 91
[Docket No. FAA-2014-0396]

Interpretation of the Special Rule for Model Aircraft

Wednesday, June 25, 2014

AGENCY: Federal Aviation Administration (FAA), DOT.

***36172** ACTION: Notice of interpretation with request for comment.

SUMMARY: This action provides interested persons with the opportunity to comment on the FAA's interpretation of the special rule for model aircraft established by Congress in the FAA Modernization and Reform Act of 2012. In this interpretation, the FAA clarifies that: Model aircraft must satisfy the criteria in the Act to qualify as model aircraft and to be exempt from future FAA rulemaking action; and consistent with the Act, if a model aircraft operator endangers the safety of the National Airspace System, the FAA has the authority to take enforcement action against those operators for those safety violations.
DATES: Effective June 23, 2014. Comments must be received on or before July 25, 2014.

ADDRESSES: You may send comments identified by docket number FAA-2014-0396 using any of the following methods:
• Federal eRulemaking Portal: Go to http://www.regulations.gov and follow the online instructions for sending your comments electronically.

• Mail: Send Comments to Docket Operations, M-30; US Department of Transportation, 1200 New Jersey Avenue SE., West Building Ground Floor, Room W12-140, West Building Ground Floor, Washington, DC 20590-0001.

• Hand Delivery: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

• Fax: (202) 493-2251.

FOR FURTHER INFORMATION CONTACT: Dean E. Griffith, Attorney, Regulations Division, Office of the Chief Counsel, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone: (202) 267-3073; email: dean.griffith@faa.gov.

SUPPLEMENTARY INFORMATION:

Comments Invited
The FAA invites interested persons to submit written comments, data, or views concerning this interpretation. The most helpful comments reference a specific portion of the interpretation, explain the reason for any recommended change, and include supporting data. To ensure the docket does not contain duplicate comments, please send only one copy of written comments, or if you are filing comments electronically, please submit your comments only one time.

The FAA will file in the docket all comments received, as well as a report summarizing each substantive public contact with FAA personnel concerning this interpretation. The FAA will consider all comments received on or before the closing date for comments and any late-filed comments if it is possible to do so without incurring expense or delay. While this is the FAA's interpretation of statute and regulations relevant to model aircraft, the FAA may modify this interpretation based on comments received.

Availability of This Interpretation

You can get an electronic copy using the Internet by—

(1) Searching the Federal eRulemaking Portal (http://www.regulations.gov);

(2) Visiting the FAA's Regulations and Policies Web page at http://www.faa.gov/regulations—policies/; or

(3) Accessing the Government Printing Office's Web page at http://www.gpoaccess.gov/fr/index.html.

You can also get a copy by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267-9680. Make sure to identify the docket number or notice number of this proposal.

Background

The FAA is issuing this interpretation because we have received many inquiries regarding the scope of the special rule for model aircraft in section 336 of the FAA Modernization and Reform Act of 2012 and the FAA's enforcement authority over model aircraft as affirmed by the statute. In this interpretation, we explain the history of FAA oversight of model aircraft operations and the new statutory requirements that apply to model aircraft operations, and then clarify how the FAA intends to apply its enforcement authority to model aircraft operations that endanger the safety of the National Airspace System (NAS).

Discussion of the Interpretation

I. Background of FAA Oversight of Model Aircraft Operations

Historically, the FAA has considered model aircraft to be aircraft that fall within the statutory and regulatory definitions of an aircraft, as they are contrivances or devices that are "invented, used, or designed to navigate, or fly in, the air." See 49 U.S.C. 40102 and 14 CFR 1.1. As aircraft, these devices generally are subject to FAA oversight and enforcement. However, consistent with FAA's enforcement philosophy, FAA's oversight of model aircraft has been guided by the risk that these operations present. The FAA first recognized in 1981 that "model aircraft can at times pose a hazard to full-scale aircraft in flight and to persons and property on the surface," and recommended a set of voluntary operating standards for model aircraft operators to follow to mitigate these safety risks. See Advisory Circular 91-57, Model Aircraft Operating Standards (June 9, 1981). These operating standards included restricting operations over populated areas, limiting use of the devices around spectators until after the devices had been flight tested and proven airworthy; restricting operations to 400 feet above the surface; requiring that the devices give right of way to, and avoid flying near manned aircraft, and using observers to assist in operations.

These guidelines were further clarified in 2007, when the FAA issued a policy statement regarding unmanned aircraft systems (UAS) operations in the NAS. See 72 FR 6689 (Feb. 13, 2007). In this policy statement, the FAA also recognized that UAS fall within the statutory and regulatory definition of "aircraft" as they are devices that are "used or [are] intended to be used for flight in the air with no onboard pilot." Id.; see also 49 U.S.C. 40102; 14 CFR 1.1. The FAA noted that they can be "as simple as a remotely controlled model aircraft used for recreational purposes or as complex as surveillance aircraft flying over hostile areas in warfare." The FAA then stated its current policy regarding UAS based

on the following three categories: (1) UAS used as public aircraft; (2) UAS used as civil aircraft; and (3) UAS used as model aircraft.

With respect to UAS used as model aircraft, the FAA reiterated the operating guidelines in AC 91-57, and further noted that to qualify as a model aircraft, the aircraft would need to be operated purely for recreational or hobby purposes, and within the visual line of sight of the operator. The policy statement also clarified that AC 91-57 ***36173** applied only to modelers and "specifically excludes its use by persons or companies for business purposes." 72 FR at 6690.

II. Requirements To Qualify as a Model Aircraft Under the FAA Modernization and Reform Act of 2012 (Pub. L. 112-95, Section 336)

A. Statutory Requirements

On February 14, 2012, the President signed into law the FAA Modernization and Reform Act of 2012 (Pub. L. 112-95) (the Act), which established, in Section 336, a "special rule for model aircraft." In Section 336, Congress confirmed the FAA's long-standing position that model aircraft are aircraft. Under the terms of the Act, a model aircraft is defined as "an unmanned aircraft" that is "(1) capable of sustained flight in the atmosphere; (2) flown within visual line of sight of the person operating the aircraft; and (3) flown for hobby or recreational purposes." Public Law 112-95, section 336(c). Congress' intention to define model aircraft as aircraft is further established by section 331(8) of the Act, which defines an unmanned aircraft as "an aircraft that is operated without the possibility of direct human intervention from within or on the aircraft." Congress' definition of model aircraft is consistent with the FAA's existing definition of aircraft as "any contrivance invented, used, or designed to navigate, or fly in, the air." 49 U.S.C. 40102; see also 14 CFR 1.1. Although model aircraft may take many forms, at a base level model aircraft are clearly "invented, used, or designed" to fly in the air. Id.

Section 336 also prohibits the FAA from promulgating "any rule or regulation regarding a model aircraft, or an aircraft being developed as a model aircraft" if the following statutory requirements are met:

• The aircraft is flown strictly for hobby or recreational use;

• the aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization;

• the aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;

• the aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and

• when flown within 5 miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control tower . . . with prior notice of the operation. . . .

Public Law 112-95, section 336(a)(1)-(5).

Thus, based on the language of the statute, we conclude that aircraft that meet the statutory definition and operational requirements, as described above, would be exempt from future FAA rulemaking action specifically regarding model aircraft. Model aircraft that do not meet these statutory requirements are nonetheless unmanned aircraft, and as such, are subject to all existing FAA regulations, as well as future rulemaking action, and the FAA intends to apply its regulations to such unmanned aircraft.

B. Model Aircraft Must Meet the Criteria in Section 336 To Be Exempt From Future Rulemaking

Congress directed that the FAA may not "promulgate any rule or regulation regarding a model aircraft, or an aircraft being developed as a model aircraft" if the aircraft is being operated, or being developed to be operated, pursuant to the five criteria enumerated in the statute as described above. Public Law 112-95, section 336(a). In other words, Congress has restricted the FAA from promulgating regulations, from the date when the statute was enacted, specifically regarding model aircraft that meet the terms of the statute.

However, the prohibition against future rulemaking is not a complete bar on rulemaking that may have an effect on model aircraft. As noted above, the rulemaking limitation applies only to rulemaking actions specifically "regarding a model aircraft or an aircraft being developed as a model aircraft." Public Law 112-95, section 336(a). Thus, the rulemaking prohibition would not apply in the case of general rules that the FAA may issue or modify that apply to all aircraft, such as rules addressing the use of airspace (e.g., the 2008 rule governing VFR operations in the Washington, DC area) for safety or security reasons. See 73 FR 46803. The statute does not require FAA to exempt model aircraft from those rules because those rules are not specifically regarding model aircraft. On the other hand, a model aircraft operated pursuant to the terms of section 336 would potentially be excepted from a UAS aircraft certification rule, for example, because of the limitation on future rulemaking specifically "regarding a model aircraft, or an aircraft being developed as a model aircraft." Public Law 112-95, section 336(a). The FAA interprets the section 336 rulemaking prohibition as one that must be evaluated on a rule-by-rule basis.

Although the FAA believes the statutory definition of a model aircraft is clear, the FAA provides the following explanation of the meanings of "visual line of sight" and "hobby or recreational purpose," terms used in the definition of model aircraft, because the FAA has received a number of questions in this area.

By definition, a model aircraft must be "flown within visual line of sight of the person operating the aircraft." Public Law 112-95, section 336(c)(2).[FN1] Based on the plain language of the statute, the FAA interprets this requirement to mean that: (1) The aircraft must be visible at all times to the operator; (2) that the operator must use his or her own natural vision (which includes vision corrected by standard eyeglasses or contact lenses) to observe the aircraft; and (3) people other than the operator may not be used in lieu of the operator for maintaining visual line of sight. Under the criteria above, visual line of sight would mean that the operator has an unobstructed view of the model aircraft. To ensure that the operator has the best view of the aircraft, the statutory requirement would preclude the use of vision-enhancing devices, such as binoculars, night vision goggles, powered vision magnifying devices, and goggles designed to provide a "first-person view" from the model.[FN2] Such devices would limit the operator's field of view thereby reducing his or her ability to see-and-avoid other aircraft in the area. Additionally, some of these devices could dramatically increase the distance at which an operator could see the aircraft, rendering the statutory visual-line-of-sight requirements meaningless. Finally, based on the plain language of the statute, which says that aircraft must be "flown within the visual line of sight of the person operating the aircraft," an operator could not rely on another person to satisfy the visual line of sight requirement. See id. (emphasis added). While the statute would not preclude using an observer to augment the safety of the operation, the operator must be able to view the aircraft at all times.

1 For purposes of the visual line of sight requirement, "operator" means the person manipulating the model aircraft's controls. FN2 The FAA is aware that at least one community-based organization permits "first person view" (FPV) operations during which the hobbyist controls the aircraft while wearing goggles that display images transmitted from a camera mounted in the front of the model aircraft. While the intent of FPV is to provide a simulation of what a pilot would see from the flight deck of a manned aircraft, the goggles may obstruct an operator's vision, thereby preventing the operator from keeping the model aircraft within his or her visual line of sight at all times.

***36174** The statute requires model aircraft to be flown strictly for hobby or recreational purposes. Because the statute and its legislative history do not elaborate on the intended meaning of "hobby or recreational purposes," we look to their ordinary meaning and also the FAA's previous interpretations to understand the direction provided by Congress.[FN3]

A definition of "hobby" is a "pursuit outside one's regular occupation engaged in especially for relaxation." Merriam-Webster Dictionary, available at www.merriam-webster.com (last accessed June 9, 2014). A definition of recreation is "refreshment of strength and spirits after work; a means of refreshment or diversion." Id. These uses are consistent with the FAA's 2007 policy on model aircraft in which the Agency stated model aircraft operating guidelines did not apply to "persons or companies for business purposes." See 72 FR at 6690.[FN4]

3 In construing statutory language, agencies should assume that the ordinary meaning of the language accurately expresses the legislative purpose of Congress. Agencies are also permitted to presume that Congress was aware of the agencies' administrative or adjudicative interpretations of certain terms and intended to adopt those meanings. See BedRoc Ltd. v. U.S., 541 U.S. 176, 183 (2004); see also Haig v. Agee, 453 U.S. 280, 300 (1981); Lorillard v. Pons, 434 U.S. 575, 580-81 (1978). FN4 The FAA has also addressed recreational use of aircraft by pilots in the Sport and Recreational Pilot Certificate rules, which prohibit those pilots from acting as pilot in command of an airplane carrying passengers or property for compensation or hire, or in furtherance of a business. 14 CFR 61.101(e), 61.315(c). As discussed in the Sport Pilot final rule, those prohibitions are designed to limit those pilots to "sport and recreational flying only." 69 FR 44772, 44839 (July 27, 2004).

Any operation not conducted strictly for hobby or recreation purposes could not be operated under the special rule for model aircraft. Clearly, commercial operations would not be hobby or recreation flights.[FN5] Likewise, flights that are in furtherance of a business, or incidental to a person's business, would not be a hobby or recreation flight. Flights conducted incidental to, and within the scope of, a business where no common carriage is involved, generally may operate under FAA's general operating rules of part 91. See Legal Interpretation to Scott C. Burgess, from Rebecca B. MacPherson, Assistant Chief Counsel for Regulations (Nov. 25, 2008). Although they are not commercial operations conducted for compensation or hire, such operations do not qualify as a hobby or recreation flight because of the nexus between the operator's business and the operation of the aircraft. See, e.g., Legal Interpretation to BSTC Corporation, from Rebecca B. MacPherson, Assistant Chief Counsel for Regulations (June 22, 2009) (noting transportation of mining employees and guests appears to be incidental to and within scope of operator's geological business); Legal Interpretation to Scott C. Burgess (Nov. 25, 2008) (noting transportation of automotive dealership employees and guests must be incidental to and within scope of operator's real estate development business).

5 A commercial operator is a "person, who, for compensation or hire, engages in the carriage by aircraft in air commerce of persons or property. . . ." See 14 CFR 1.1. The FAA would therefore not consider a commercial operation to be "flown strictly for hobby or recreation purposes" because it would be conducted for compensation or hire.

To provide guidance, the following are examples of flights that could be conducted as hobby or recreation flights and other types of flights that would not be hobby or recreation.

Hobby or recreation	Not hobby or recreation
Part III	
Flying a model aircraft at the local model aircraft club.	Receiving money for demonstrating aerobatics with a model aircraft.
Taking photographs with a model aircraft for personal use.	A realtor using a model aircraft to photograph a property that he is trying to sell and using the photos in the property's real estate listing.
	A person photographing a property or event and selling the photos to someone else.
Using a model aircraft to move a box from point to point without any kind of compensation.	Delivering packages to people for a fee. [6]

Viewing a field to determine whether crops need water when they are grown for personal enjoyment.	Determining whether crops need to be watered that are grown as part of commercial farming operation.

Operations that meet the section 336 definition of "model aircraft" must also meet the five additional criteria for model aircraft established in section 336(a) to be exempt from future rulemaking regarding model aircraft. These criteria, with the exception of the hobby and recreation standard that was previously addressed, are explained below.

6 If an individual offers free shipping in association with a purchase or other offer, FAA would construe the shipping to be in furtherance of a business purpose, and thus, the operation would not fall within the statutory requirement of recreation or hobby purpose.

Section 336(a)(2) requires model aircraft to be operated within a community-based set of safety guidelines and within the programming of a nationwide community-based organization. Congress explained that it intended "nationwide community-based organization" to mean, in part, a "membership based association that represents the aeromodeling community within the Unites States; [and] provides its members a comprehensive set of safety guidelines that underscores safe aeromodeling operations within the National Airspace System and the protection and safety of the general public on the ground. . . ." U.S. House, FAA Modernization and Reform Act of 2012, Conference Report (to Accompany H.R. 658), 112 H. Rpt. 381 (Feb. 1, 2012) (discussion of special rule for model aircraft). Based on this language, which provides context to Congress' use of the term "nationwide community-based organization," the FAA expects that model aircraft operations conducted under section 336(a) will be operated according to those guidelines.[FN7]

7 "[C]ommunity-based organizations," for example, would include groups such as the Academy of Model Aeronautics and others that meet the statutory definition.

Additionally, model aircraft are limited to 55 pounds or less. The statutory language does not specify whether it applies to 55 pounds unloaded or 55 pounds with other equipment, payload, or fuel, for example, on the aircraft. The FAA believes that Congress intended for the 55-pound limit to mean the weight of the aircraft at the time of the operation. If the weight of the aircraft, alone, was the determining factor then it could conceivably be loaded with equipment or payload increasing the weight of the aircraft at time of takeoff well in excess of 55 pounds, thereby increasing the risk of harm should the operation not proceed as planned. The weight at the time of operation is also consistent with the FAA's designation of small or large aircraft which is determined by an aircraft's maximum certificated takeoff weight. See, e.g., 14 CFR 1.1 (defining small and large aircraft). Congress' recognition of the increased risk posed ***36175** by heavier aircraft is demonstrated by the more stringent requirements for aircraft heavier than 55 pounds in the statute which are discussed below. Accordingly, the FAA interprets this provision to mean the weight of the aircraft at the time of the operation must not exceed 55 pounds, including the weight of any payload and fuel.

The statute creates an exception for model aircraft that exceed the 55-pound weight limit if the aircraft is "certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization." Public Law 112-95, section 336(a)(3). If a nationwide community-based organization has provided its members with a set of safety guidelines that define a design, construction, inspection, flight test, and operational safety program then model aircraft constructed in accordance with that program may exceed 55 pounds and operate in accordance with section 336(a).

Model aircraft must not interfere with and must give way to any manned aircraft. This requirement needs no further explanation, and the FAA would expect that model aircraft operators abide by it.[FN8] We note that model aircraft interfering with, or that do not give way to, manned aircraft would be subject to enforcement action under section 336(b), as further explained in section III below.

8 This requirement is consistent with longstanding FAA guidance for model aircraft operators. See AC 91-57, para. 3 (advising model aircraft operators to "[g]ive right of way to, and avoid flying in the proximity of, full-scale aircraft.").

Finally, the statute sets a requirement for model aircraft operating within 5 miles [FN9] of an airport to notify the airport operator and control tower, where applicable, prior to operating.[10] [11] If the model aircraft operator provides notice of forthcoming operations which are then not authorized by air traffic or objected to by the airport operator, the FAA expects the model aircraft operator will not conduct the proposed flights. The FAA would consider flying model aircraft over the objections of FAA air traffic or airport operators to be endangering the safety of the NAS. Additionally, we note that following this 5-mile notification procedure would be read in conjunction with FAA rules governing airspace usage discussed below.

9 For ease of determining distance, the FAA interprets the statute to mean 5 statute miles.

FN10 This requirement is consistent with longstanding FAA guidance for model aircraft operators. See AC 91-57, para. 3 (advising model aircraft operators to notify an airport operator, control tower, for flight service station when planning to operate within three miles of an airport).

FN11 If a group of modelers intends to operate in one area, one person could contact air traffic control on behalf of the group. Additionally, consistent with the statute, the FAA encourages operators who fly from a permanent location within 5 miles of an airport to "establish a mutually-agreed upon operating procedure with the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport)."

III. Scope of FAA's Enforcement Authority

As discussed above, if a model aircraft is operated consistently with the terms of section 336(a) and (c), then it would not be subject to future FAA regulations regarding model aircraft. However, Congress also recognized the potential for such operations to endanger other aircraft and systems of the NAS. Therefore, it specifically stated that "[n]othing in this section shall be construed to limit the authority of the Administrator to pursue enforcement action against persons operating model aircraft who endanger the safety of the national airspace system." Public Law 112-95, section 336(b).

Through this language, Congress specifically recognized the FAA's existing authority to take enforcement action to protect the safety of the NAS.[FN12] Moreover, it did not limit the FAA's authority to take enforcement action where a violation of a regulation results in the endangerment of the NAS. As demonstrated by the FAA's statutory and regulatory authorities, our charge to protect the safety of the NAS is not only intended to protect users of the airspace, but is also intended to protect persons and property on the ground.[FN13]

12 The NAS is broadly described as "the common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared jointly with the military." See FAA Aeronautical Information Manual (Apr. 3, 2014), available at http://www.faa.gov/air—traffic/publications/media/AIM—Basic—4-03-14.pdf.

FN13 See 49 U.S.C. 40103(b)(2) (authorizing the FAA to prescribe air traffic regulations to protect people and property on the ground); Adm'r v. Johnson, NTSB Order No. EA-1008, 1977 WL 22279 at *2 (May 10, 1977) (recognizing FAA authority to promulgate regulations to protect persons and property on the ground); Adm'r v. Page, NTSB Order No. EA-2786, 1988 WL 250725 at *3 (July 19, 1988) (finding FAA's rulemaking and enforcement authority extends to areas away from runways and taxiways—in this case the ramp of a fixed base operator).

For example, the FAA regulates low-altitude operations to protect people and property on the ground. The FAA permits aircraft operations below 500 feet when flown over open water and in sparsely populated areas. 14 CFR 91.119(c). Such operations may not be conducted "closer than 500 feet to any person, vessel, vehicle, or structure." Id. Therefore, although such low-altitude operations may pose a lower risk to aircraft flying much higher, the operation may still pose a risk to persons and property on the ground warranting enforcement action when conducted unsafely. See, e.g., Adm'r

v. Kachalsky, NTSB Order No. EA-4847, 2000 WL 1072332 (July 24, 2000) (affirming a violation of § 91.119(c) for operating within 500 feet of a dwelling in a sparsely populated area); Adm'r v. Beissel, NTSB Docket No. SE-19436, 2013 WL 7809754 (Dec. 11, 2014) (ordering suspension of a pilot certificate when pilot flew a helicopter less than 40 feet above the surface of a lake).

Reading the broad reference to the NAS, along with Congress' clear interest in ensuring that model aircraft are safely operated, we conclude that Congress intended for the FAA to be able to rely on a range of our existing regulations to protect users of the airspace and people and property on the ground. Therefore, regardless of whether a model aircraft satisfies the statutory definition and operational requirements described above, if the model aircraft is operated in such a manner that endangers the safety of the NAS, the FAA may take enforcement action consistent with Congress' mandate.

IV. Examples of Regulations That Apply to Model Aircraft

The FAA could apply several regulations in part 91 when determining whether to take enforcement action against a model aircraft operator for endangering the NAS. The FAA's general operating and flight rules are housed in part 91 of the FAA's regulations. These rules are the baseline rules that apply to all aircraft operated in the United States with limited exceptions,[FN14] and are the appropriate rules to apply when evaluating model aircraft operations. See 14 CFR 91.1.

14 Part 91 does not apply to moored balloons, kites, unmanned rockets, and unmanned free balloons, and ultralights vehicles operated under 14 CFR parts 101 and 103.

Rules relevant to these operations fall generally into three categories: (1) How the aircraft is operated; (2) operating rules for designated airspace; and, (3) special restrictions such as temporary flight restrictions (TFRs) and notices to airmen (NOTAMs). These rules are discussed in greater detail below.

Rules addressing operation of the aircraft may include prohibitions on careless or reckless operation and dropping objects so as to create a hazard ***36176** to persons or property. See 14 CFR 91.13 through 91.15. Additionally, § 91.113 establishes right-of-way rules for converging aircraft.[FN15] Model aircraft that do not comply with those rules could be subject to FAA enforcement action.

15 Additionally, model aircraft must not interfere with and must always give way to any manned aircraft. Section 336(a)(4).

Rules governing operations in designated airspace are found in §§ 91.126 through 91.135. In general, those rules establish requirements for operating in the various classes of airspace, and near airports in non-designated airspace to minimize risk of collision in higher traffic airspace. Generally, if an operator is unable to comply with the regulatory requirements for operating in a particular class of airspace, the operator would need authorization from air traffic control to operate in that area. See, e.g., 14 CFR 91.127(a), 91.129(a). Operations within restricted areas designated in part 73 would be prohibited without permission from the using or controlling agency. Accordingly, as part of the requirements for model aircraft operations within 5 miles of an airport set forth in section 336(a)(4) of Public Law 112-95, the FAA would expect modelers operating model aircraft in airspace covered by §§ 91.126 through 91.135 and part 73 to obtain authorization from air traffic control prior to operating.

The third category of rules relevant to model aircraft operations are rules relating to operations in areas covered by temporary flight restrictions and NOTAMs found in §§ 91.137 through 91.145. The FAA would expect that model aircraft operations comply with restrictions on airspace when established under these rules.

Other rules in part 91, or other parts of the regulations, may apply to model aircraft operations, depending on the particular circumstances of the operation. The regulations cited above are not intended to be an exhaustive list of rules

that could apply to model aircraft operations. The FAA anticipates that the cited regulations are the ones that would most commonly apply to model aircraft operations.

Issued in Washington, DC, on June 18, 2014.

Michael P. Huerta,

Administrator.

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BILLING CODE 4910-13-P

Federal Aviation Administration

Getting Started

The **NEW** Small UAS Rule (Part 107), including all pilot and operating rules, is in effect as of 12:01 a.m. EDT on **August 29, 2016**.

For more information, please review the following materials:

- Latest UAS News (www.faa.gov/news/)
- Summary of the Small UAS Rule (www.faa.gov/uas/media/Part_107_Summary.pdf) (PDF)
- Small UAS Advisory Circular – How to Use the Rule (www.faa.gov/uas/media/AC_107-2_AFS-1_Signed.pdf) (PDF)
- Complete Text of the Small UAS Rule (https://www.federalregister.gov/articles/2016/06/28/2016-15079/operation-and-certification-of-small-unmanned-aircraft-systems)
- Part 107 Knowledge Test Prep (www.faa.gov/uas/getting_started/fly_for_work_business/becoming_a_pilot/)
- How to fly a UAS for your work or business (www.faa.gov/uas/getting_started/fly_for_work_business/)

The rules for operating an unmanned aircraft depend on why you want to fly.

	Fly for Fun (fly_for_fun/)	**Fly for Work** (fly_for_work_business/)
Pilot Requirements	No pilot requirements	Must have Remote Pilot Airman Certificate Must be 16 years old Must pass TSA vetting
Aircraft Requirements	Must be registered if over 0.55 lbs.	Must be less than 55 lbs. Must be registered if over 0.55 lbs. (online) Must undergo pre-flight check to ensure UAS is in condition for safe operation
Location Requirements	5 miles from airports without prior notification to airport and air traffic control	Class G airspace*
Operating Rules	Must ALWAYS yield right of way to manned aircraft Must keep the aircraft in sight (visual line-of-sight) UAS must be under 55 lbs. Must follow community-based safety guidelines Must notify airport and air traffic control tower before flying within 5 miles of an airport	Must keep the aircraft in sight (visual line-of-sight)* Must fly under 400 feet* Must fly during the day* 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*

	Fly for Fun (fly_for_fun/)	**Fly for Work** (fly_for_work_business/)
Example Applications	Educational or recreational flying only	Flying for commercial use (e.g. providing aerial surveying or photography services) Flying incidental to a business (e.g. doing roof inspections or real estate photography)
Legal or Regulatory Basis	Public Law 112-95, Section 336 – *Special Rule for Model Aircraft* FAA Interpretation of the Special Rule for Model Aircraft	Title 14 of the Code of Federal Regulation (14 CFR) Part 107

*These rules are subject to waiver (fly_for_work_business/beyond_the_basics/#waiver).

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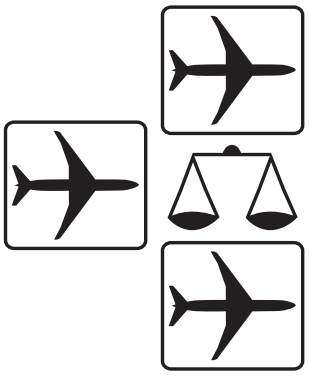

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Introduction

Unmanned aircraft systems (UAS), or drones, represent the most disruptive technology to come to aviation since the jet engine. According to the Techopedia™ website, a disruptive technology is "… any enhanced or completely new technology that replaces and disrupts an existing technology, rendering it obsolete … ." In this case, the new technology is having a disruptive effect on the US National Airspace System.

Commercial applications for unmanned aircraft range from news gathering, movie making, infrastructure inspection, precision agriculture, package delivery, and many more. Personal uses are also on the rise. The Consumer Technology Association estimated that the Christmas season of 2015 would result in about 400,000 units being sold in the US.

Sensor technologies for the aircraft are increasing in types and sophistication. High resolution cameras are being supplemented by inexpensive infrared cameras and Lidar (laser-based 3D imaging). Intel recently announced it is installing its 3D camera technology on small drones to allow for them to detect and avoid nearby objects.

Investment in the sector is also growing quickly. The Teal Group estimates that the unmanned aircraft industry will be worth $93 billion by 2021.[1] Industry and trade association analysts believe the current predominance of military sales will begin to transition to the commercial sector over the next five years. Many companies who have had only military sales are now engaged in actively pursuing the civil market for their aircraft.

However, this growth has led to many policy and regulatory issues that must be addressed before the industry can reach its potential. The FAA will release its long-awaited regulatory structure for small unmanned aircraft, but this is only a first step toward a comprehensive structure to deal with all aspects of the industry. State and local legislators are struggling with privacy issues raised by their constituents, while the National Telecommunications and Information Administration works with the stakeholders to develop best practices for operators.

Regulatory issues

In February of 2012 the US Congress passed a reauthorization bill for the FAA titled "FAA Modernization and Reform Act of 2012" (FMRA). This bill contained 17 specific milestones for the FAA to accomplish, including a deadline for "Safe integration of Unmanned Aircraft Systems into the National Airspace System"[2] A key provision of the Act was a direction to the FAA to complete rulemaking for small UAS. The FAA released its Notice of

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1 Teal Group, Press Release: *UAV Production Will Total $93 Billion*, August 19, 2015, http://tealgroup.com/index.php/teal-group-news-media/item/press-release-uav-production-will-total-93-billion.

2 FAA Modernization and Reform Act of 2012 (Public Law 112-95), H.R. 658, 112th Cong. § 331-336 (2012).

Proposed Rulemaking (NPRM) to address this mandate in February of 2015, and they have committed to Congress to have the final rule out by June of 2016.[3] This rule creates a comprehensive structure for the approval of UAS operations within line of sight of the aircraft operator. It also creates a new airman's certificate for UAS operators that will greatly ease the requirements for operating a small UAS or drone.

These proposed rules also codify the provisions of section 336 of the FMRA that prohibit the FAA from promulgating regulations that would affect hobby or recreational use of model aircraft. A model aircraft is defined in the act as: an aircraft operated for hobby or recreational purposes only; the operation is conducted pursuant to a "community-based set of safety guidelines and within the programming of a nationwide community-based organization"; the aircraft weighs less than 55 pounds; the operation does not interfere with manned aircraft; and the operator gives "prior notice" to the air traffic control tower and airport operator of any operation within five miles of the airport.[4]

However, 2015 saw a huge increase in the numbers of reported incidents of drones coming too close to manned aircraft. These reports ranged from alleged "collisions" and "near-misses," to interference with police and fire-fighting operations, to accidents in which small drones went out of control and struck a bystander. Some incidents were reported where unmanned aircraft were flying above 20,000 feet, which is unlikely for consumer drones, although military UAS regularly operate at those altitudes. These reports raise legitimate safety

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[3] Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. 9544 (proposed February 23, 2015) (to be codified at 14 C.F.R. pt. 107).

[4] FAA Modernization and Reform Act of 2012, *supra*, § 336(a)(2)-(a)(5).

concerns given the increasing number of drones and the lack of any clear standards for operation by consumers. The FAA has addressed this issue by creating registration rules for users of drones in what amounted to record time for a significant rulemaking.

The rulemaking process was initiated in October, and by December of 2015 the FAA published its final rule. The FAA has stated that this new rule requiring registration of all consumer drone and hobby aircraft operators will help address the growing number of unsafe drone operations in the US. The rule requires all operators of drones weighing more than 250 grams (~1/2 lb.) to register and mark all their drones with their registration number.[5] The Academy of Model Aeronautics has publicly questioned the legality of this new rule because of the provisions of Section 336 outlined above.

The concern over unsafe operations and privacy issues has led states and municipalities throughout the country to pass drone-related restrictions. This growing and often conflicting set of federal, state, and local laws, regulations, and "guidelines" make it difficult for anyone to know what is and what is not legal. There is a very strong possibility that these state and local laws will conflict with the federal rules and consequently trigger federal preemption.

In September of 2015, the city of Los Angeles passed an ordinance which makes it a misdemeanor to operate a drone for recreational purposes outside of the advisory guidelines

[5] Registration and Marking Requirements for Small Unmanned Aircraft, 80 Fed. Reg. 78593, December 21, 2015 (to be codified at 14 C.F.R. pt. 48).

published by the FAA.[6] Many of the provisions of this law establish operating requirements that could be preempted by the federal laws establishing the FAA as the sole arbiter of operations in the national airspace.

In 2015, the California legislature passed several bills that would have criminalized certain uses of drones. One of these bills would have prohibited consumer drones from flying over any private property below 350 feet without express permission from the property owner.[7] The bills were vetoed by Governor Jerry Brown because: "Each of these bills creates a new crime—usually by finding a novel way to characterize and criminalize conduct that is already proscribed. This multiplication and particularization of criminal behavior creates increasing complexity without commensurate benefit."

Northampton, Massachusetts, passed a resolution for their city: "the navigable airspace for drone aircraft shall not be expanded below the long-established airspace for manned aircraft," "landowners subject to state laws and local ordinances have exclusive control of the immediate reaches of the airspace," and that "no drone aircraft shall have the 'public right of transit' through this private property."[8] This ordinance raises significant federal preemption issues.

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6 *Joseph Serna, "Drone Pilots Could Get Jail Time, Fine For Violating New L.A. Ordinance,*" Los Angeles Times, October 14, 2015, http://www.latimes.com/local/lanow/la-me-ln-la-passes-new-drone-ordinance-20151014-story.html.

7 S.B. 142 (Ca. 2015).

8 Resolution On Drone Aircraft, Northampton, Massachusetts, July 11, 2013, http://www.northamptonma.gov/DocumentCenter/View/1103.

Another example of local ordinances that restrict drone use is the city of Rolling Hills Estates (an affluent Los Angeles suburb), which enacted the following:

> 8.36.040 - Model aircraft prohibition. No person shall fly a model aircraft within the city limits. For the purpose of this section, "model aircraft" means and includes any model aircraft which maintains flight by means of an electric motor or fueled engine.[9]

This law clearly is in conflict with the FAA's authority over navigable airspace. The courts will have to address the specifics of where state and local authority over land-use (including trespass and zoning), privacy, and security/law enforcement issues end and federal authority begins.

In *United States v. Causby*[10], the Supreme Court addressed the issue of aircraft and how they impact the rights of landowners. Causby was a chicken farmer in North Carolina who lived near a small airport. During World War II, the Army took over the airport, and large military planes began flying over Causby's chicken coops at very low altitudes. The noise from the planes scared Causby's chickens, causing them to panic and kill themselves while trying to flee. Causby sued for damages, arguing that this was a "taking" under the Fifth Amendment. While finding in favor of Causby, the Supreme Court held that a landowner had rights to "at least as much of the space above the ground as he can occupy or use in connection with the land." If the government or any other party intrudes into that space, such intrusions should be treated "in the same category as invasions of the surface." However, the decision is silent on whether the FAA's ability to regulate the airspace is limited to a specific altitude (as opposed to establishing the circumstances where aircraft operations would be considered a "taking" of the property under it).

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9 City Of Rolling Hills Estates Municipal Code § 8.36.040 (2015).

10 328 U.S. 256 (1946).

The court did not say the property owner had any right to prevent the use of the airspace above his property. Consequently, the limits of the navigable airspace may still have to be addressed by the courts. The FAA defines "navigable airspace" as where an aircraft can safely navigate.[11]

To help state and local governments better understand the preemption issues, the FAA published the "State and Local Regulation of Unmanned Aircraft Systems (UAS) Fact Sheet" that addresses its authority over the airspace. The document is included as Appendix A. A key provision is:

> Substantial air safety issues are raised when state or local governments attempt to regulate the operation or flight of aircraft. If one or two municipalities enacted ordinances regulating UAS in the navigable airspace and a significant number of municipalities followed suit, fractionalized control of the navigable airspace could result. In turn, this 'patchwork quilt' of differing restrictions could severely limit the flexibility of FAA in controlling the airspace and flight patterns, and ensuring safety and an efficient air traffic flow. A navigable airspace free from inconsistent state and local restrictions is essential to the maintenance of a safe and sound air transportation system. [12]

The FAA also asserts in the fact sheet that it maintains authority over "operational UAS restrictions on flight altitude, flight paths; operational bans; any regulation of the navigable airspace." However, the FAA also explains that there are areas where state and local governments have authority to act without the risk of preemption. Examples include:

- Requirement for police to obtain a warrant prior to using UAS for surveillance
- Specifying that UAS may not be used for voyeurism
- Prohibitions on using UAS for hunting or fishing, or to interfere with or harass an individual who is hunting or fishing
- Prohibitions on attaching firearms or similar weapons to UAS

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11 49 U.S.C. § 40102(a)(32).

12 FAA Office of the Chief Counsel, UAS Fact Sheet, December 17, 2015, Appendix A.

In the meantime, local governments are not necessarily interested in waiting for the FAA.

Beyond visual line of sight operations

The FAA regulations promised in June of 2016 only address operations of small unmanned aircraft in the visual line of sight of the aircraft operator. Many of the proposed operations of UAS require operation beyond visual line of sight (BVLOS) of the pilot. These operations present significant legal and regulatory challenges to UAS operations in the US airspace .

The entire system of aircraft operations in the US airspace is based on the assumption that the pilot in the aircraft can see and avoid other aircraft. Almost all of the commercial operations conducted today are within the sight of the pilot. These operations accomplish the see-and-avoid requirement by limiting the distance of operation so the pilot of the unmanned aircraft can safely avoid all manned aircraft. Obviously this limitation must be overcome by technology and changes to the regulations if UAS are to reach their full potential.

The regulatory basis for the see-and-avoid requirement is found in the Code of Federal Regulations Title 14, §91.113, "Right-of-way rules: Except water operations." The key words in the rule are: "…vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft …"[13] The term "see" has historically been interpreted by the FAA to

[13] 14 C.F.R. §91.113 (b) "General. When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right-of-way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear."

mean the pilot's eyes looking out of the windscreen of the aircraft. Consequently, every unmanned aircraft, by definition, cannot meet this rule. This is why the FAA uses the Certificate of Waiver or Authorization (COA) process to authorize every approved unmanned aircraft operation in the US airspace. This process is based on a list of operating rules that can be waived according to CFR Title 14 §91.905 – "List of rules subject to waivers."

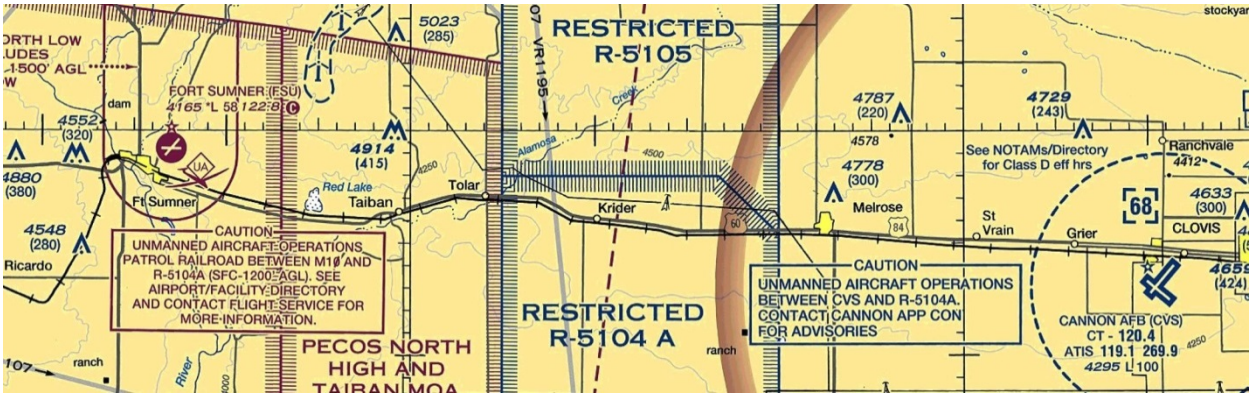
The FAA has recently demonstrated BVLOS operations using procedural separation techniques. The demonstrations were conducted along a section of BNSF rail line in New Mexico, and in the international waters off the coast of Alaska. The operations in the Arctic waters of the Chukchi and Beaufort seas in the summer of 2015 enabled the FAA to comply with a congressional mandate to open the international waters off the coast of Alaska to BVLOS operations from the surface to 2,000 feet above the water.[14]

Conoco Phillips was the first operator to take advantage of this procedural airspace by flying a Boeing Insitu ScanEagle aircraft launched from a research ship in the Chukchi Sea. Conoco Phillips coordinates their UAS operations with Alaska Flight Service to make sure no unmanned operations are conducted when manned aircraft are operating in the area.

[14] FAA Modernization and Reform Act of 2012 (Public Law 112-95), H.R. 658, 112th Cong. § 332 (d) (2012).

ScanEagle launch (photo by Erin Moreland)

The operations along the BNSF rail lines in New Mexico started in the fall of 2015 as a part of the FAA's BVLOS Pathfinder Project. The FAA added cautions to the charts for the airspace along ~130 miles of BNSF track (see below). This operation uses the same FAA Certified (Restricted Category) Scan Eagle aircraft that are being used in the Chukchi Sea.



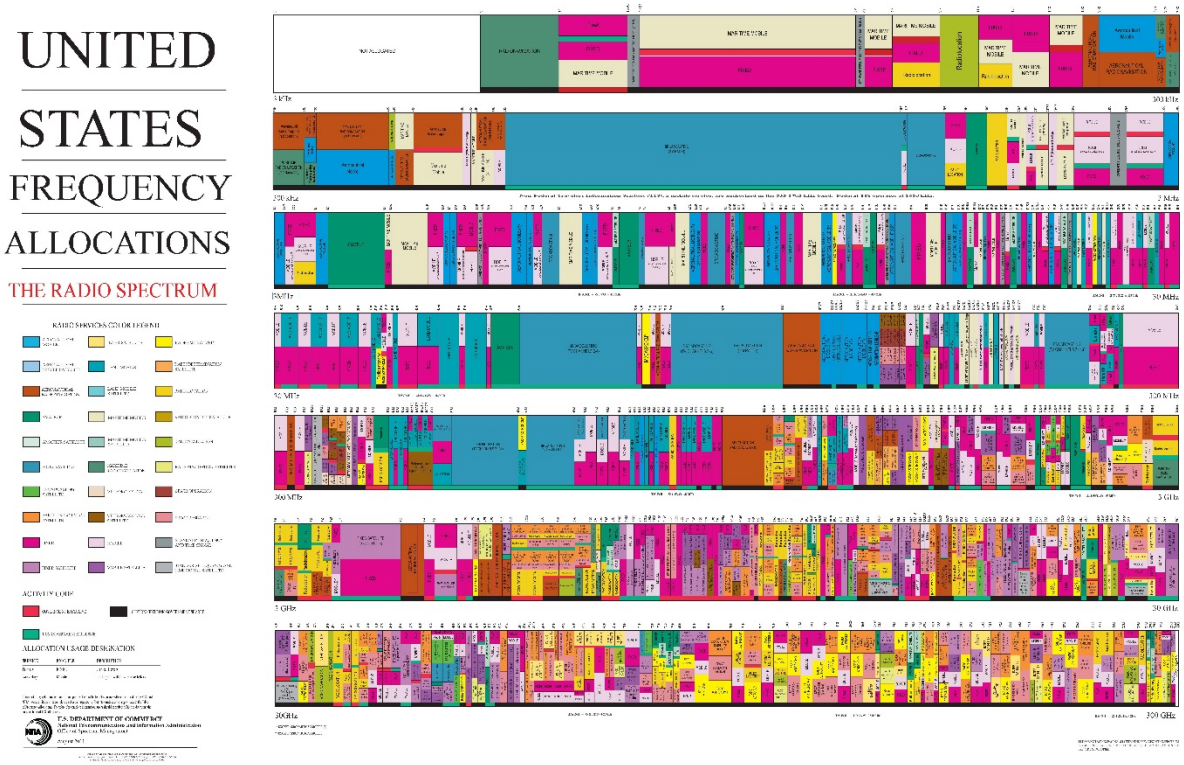
BNSF Flight Corridor from FAA Visual Flight Rules Sectional Chart

The long-term solution for BVLOS operations will require a technical solution to allow the unmanned aircraft to detect and avoid manned aircraft that it encounters. Technology to allow operations beyond visual line of sight is under development but has yet to be certified. Standards for this technology are being produced but are not expected until the summer of 2016.

Unfortunately, these new standards will not be suitable for the small aircraft used by individuals; rather, they are intended for larger aircraft flown for military and commercial purposes.

Spectrum management

One of the key ways the FAA minimizes risks for safety services that use radio signals is to use protected aviation spectrum. Currently unmanned aircraft operating in the US airspace use an assortment of unlicensed bands (e.g., 2.4 GHz) or bands reserved for government use. UAS operated in the US airspace will need to use safety protected spectrum to reduce the possibility of inadvertent jamming as a possible cause of a lost link situation. Consequently, the US Delegation to the World Radio Conference of 2012 led a successful effort to obtain international permission to use two sections of the aviation safety protected spectrum for command and control of UAS.



NTIA spectrum allocation chart

However, there are many obstacles that must be overcome before these two bands can be used in the US. This portion of the spectrum is currently assigned for government use and is managed by the National Telecommunications and Information Administration (NTIA). Several regulatory actions must take place before the spectrum can be used for this new purpose. The Federal Communications Commission (FCC) must change the US table of allocations to allow the new use and the FAA must develop a standard that defines how the new spectrum will be divided up for use by UAS. The standard is scheduled to be completed by the summer of 2016. Following the completion of the standard, the NTIA, in cooperation with the FCC, will promulgate a new regulation to establish the usage rules for the bands.

Conclusion

Much work has been done to move the US National Airspace System toward integration of unmanned aircraft operations. However, the technology is advancing far faster than the regulatory environment can accommodate. Many regulatory and policy issues must be addressed by the FAA and the preemption boundaries need to be established to eliminate the patchwork of state and local regulations.

Technical and regulatory challenges to BVLOS must be resolved to open up many of the benefits for unmanned aircraft operations in the US airspace. UAS will require high reliability command and control links and technology to allow them to avoid manned aircraft. The FAA, in collaboration with the FCC, the NTIA and the UAS industry, must work together to develop the solutions to these challenges.

When all these legal, technical, and regulatory challenges are met, we will begin to see routine operations of civil and military unmanned aircraft in the US National Airspace System. Only then will the enormous benefits across many sectors of the US economy be realized.

APPENDIX A

State and Local Regulation of Unmanned Aircraft Systems (UAS)
Fact Sheet

Federal Aviation Administration
Office of the Chief Counsel

December 17, 2015

BACKGROUND

Unmanned aircraft systems (UAS) are aircraft subject to regulation by the FAA to ensure safety of flight, and safety of people and property on the ground. States and local jurisdictions are increasingly exploring regulation of UAS or proceeding to enact legislation relating to UAS operations. In 2015, approximately 45 states have considered restrictions on UAS. In addition, public comments on the Federal Aviation Administration's (FAA) proposed rule, "Operation and Certification of Small Unmanned Aircraft Systems" (Docket No. FAA-2015-0150), expressed concern about the possible impact of state and local laws on UAS operations.

Incidents involving unauthorized and unsafe use of small, remote-controlled aircraft have risen dramatically. Pilot reports of interactions with suspected unmanned aircraft have increased from 238 sightings in all of 2014 to 780 through August of this year. During this past summer, the presence of multiple UAS in the vicinity of wild fires in the western U.S. prompted firefighters to ground their aircraft on several occasions.

This fact sheet is intended to provide basic information about the federal regulatory framework for use by states and localities when considering laws affecting UAS. State and local restrictions affecting UAS operations should be consistent with the extensive federal statutory and regulatory framework pertaining to control of the airspace, flight management and efficiency, air traffic control, aviation safety, navigational facilities, and the regulation of aircraft noise at its source.

Presented below are general principles of federal law as they relate to aviation safety, and examples of state and local laws that should be carefully considered prior to any legislative action to ensure that they are consistent with applicable federal safety regulations. The FAA's Office of the Chief Counsel is available for consultation on specific questions.

WHY THE FEDERAL FRAMEWORK

Congress has vested the FAA with authority to regulate the areas of airspace use, management and efficiency, air traffic control, safety, navigational facilities, and aircraft noise at its source. 49 U.S.C. §§ 40103, 44502, and 44701-44735. Congress has directed the FAA to "develop plans and policy for the use of the navigable airspace and assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace." 49 U.S.C. § 40103(b)(1). Congress has further directed the FAA to "prescribe air traffic regulations on the flight of aircraft (including regulations on safe altitudes)" for navigating, protecting, and

identifying aircraft; protecting individuals and property on the ground; using the navigable airspace efficiently; and preventing collision between aircraft, between aircraft and land or water vehicles, and between aircraft and airborne objects. 49 U.S.C. § 40103(b)(2).

A consistent regulatory system for aircraft and use of airspace has the broader effect of ensuring the highest level of safety for all aviation operations. To ensure the maintenance of a safe and sound air transportation system and of navigable airspace free from inconsistent restrictions, FAA has regulatory authority over matters pertaining to aviation safety.

REGULATING UAS OPERATIONS

In Section 333 of the FAA Modernization and Reform Act of 2012 (Public Law No. 112-95), Congress directed the Secretary to determine whether UAS operations posing the least amount of public risk and no threat to national security could safely be operated in the national airspace system (NAS) and if so, to establish requirements for the safe operation of these systems in the NAS.

On February 15, 2015, the FAA proposed a framework of regulations that would allow routine commercial use of certain small UAS in today's aviation system, while maintaining flexibility to accommodate future technological innovations. The FAA's Notice of Proposed Rulemaking offered safety rules for small UAS (under 55 pounds) conducting non-recreational or non-hobby operations. The proposed rule defines permissible hours of flight, line-of-sight observation, altitude, operator certification, optional use of visual observers, aircraft registration and marking, and operational limits.

Consistent with its statutory authority, the FAA is requiring Federal registration of UAS in order to operate a UAS. Registering UAS will help protect public safety in the air and on the ground, aid the FAA in the enforcement of safety-related requirements for the operation of UAS, and build a culture of accountability and responsibility among users operating in U.S. airspace. No state or local UAS registration law may relieve a UAS owner or operator from complying with the Federal UAS registration requirements. Because Federal registration is the exclusive means for registering UAS for purposes of operating an aircraft in navigable airspace, no state or local government may impose an additional registration requirement on the operation of UAS in navigable airspace without first obtaining FAA approval.

Substantial air safety issues are raised when state or local governments attempt to regulate the operation or flight of aircraft. If one or two municipalities enacted ordinances regulating UAS in the navigable airspace and a significant number of municipalities followed suit, fractionalized control of the navigable airspace could result. In turn, this 'patchwork quilt' of differing restrictions could severely limit the flexibility of FAA in controlling the airspace and flight patterns, and ensuring safety and an efficient air traffic flow. A navigable airspace free from inconsistent state and local restrictions is essential to the maintenance of a safe and sound air transportation system. *See Montalvo v. Spirit Airlines*, 508 F.3d 464 (9th Cir. 2007), and *French v. Pan Am Express, Inc.*, 869 F.2d 1 (1st Cir. 1989); *see also Arizona v. U.S.*, 567 U.S. ___, 132 S.Ct. 2492, 2502 (2012) ("Where Congress occupies an entire field . . . even complimentary state regulation is impermissible. Field preemption reflects a congressional decision to foreclose any

state regulation in the area, even if it is parallel to federal standards."), and *Morales v. Trans World Airlines, Inc.*, 504 U.S. 374, 386-87 (1992).

EXAMPLES OF STATE AND LOCAL LAWS FOR WHICH CONSULTATION WITH THE FAA IS RECOMMENDED

- Operational UAS restrictions on flight altitude, flight paths; operational bans; any regulation of the navigable airspace. For example – a city ordinance banning anyone from operating UAS within the city limits, within the airspace of the city, or within certain distances of landmarks. Federal courts strictly scrutinize state and local regulation of overflight. *City of Burbank v. Lockheed Air Terminal*, 411 U.S. 624 (1973); *Skysign International, Inc. v. City and County of Honolulu*, 276 F.3d 1109, 1117 (9th Cir. 2002); *American Airlines v. Town of Hempstead*, 398 F.2d 369 (2d Cir. 1968); *American Airlines v. City of Audubon Park*, 407 F.2d 1306 (6th Cir. 1969).

- Mandating equipment or training for UAS related to aviation safety such as geo-fencing would likely be preempted. Courts have found that state regulation pertaining to mandatory training and equipment requirements related to aviation safety is not consistent with the federal regulatory framework. *Med-Trans Corp. v. Benton*, 581 F. Supp. 2d 721, 740 (E.D.N.C. 2008); *Air Evac EMS, Inc. v. Robinson*, 486 F. Supp. 2d 713, 722 (M.D. Tenn. 2007).

EXAMPLES OF STATE AND LOCAL LAWS WITHIN STATE AND LOCAL GOVERNMENT POLICE POWER

Laws traditionally related to state and local police power – including land use, zoning, privacy, trespass, and law enforcement operations – generally are not subject to federal regulation. *Skysign International, Inc. v. City and County of Honolulu*, 276 F.3d 1109, 1115 (9th Cir. 2002). Examples include:

- Requirement for police to obtain a warrant prior to using a UAS for surveillance.
- Specifying that UAS may not be used for voyeurism.
- Prohibitions on using UAS for hunting or fishing, or to interfere with or harass an individual who is hunting or fishing.
- Prohibitions on attaching firearms or similar weapons to UAS.

CONTACT INFORMATION FOR QUESTIONS

The FAA's Office of the Chief Counsel is available to answer questions about the principles set forth in this fact sheet and to consult with you about the intersection of federal, state, and local regulation of aviation, generally, and UAS operations, specifically. You may contact the Office of Chief Counsel in Washington, D.C. or any of the following Regional Counsels:

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Regulations Division (AGC-200)
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(AK)

Central Region
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(816) 329-3760
(IA, KS, MO, NE)

Eastern Region
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Jamaica, NY 11434-4848
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(DC, DE, MD, NJ, NY, PA, VA, WV)

Great Lakes Region
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O'Hare Lake Office Center
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New England Region
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Northwest Mountain Region
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(CO, ID, MT, OR, UT, WA, WY)

Sothern Region
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Southwest Region
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Fort Worth, TX 76177
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Office of the Regional Counsel
P.O. Box 92007
Los Angeles, CA 90009
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(AZ, CA, HI, NV)

APPENDIX – LIST OF AUTHORITIES

Federal Statutes

- 49 U.S.C. §§ 40103, 44502, and 44701- 44735 (former Federal Aviation Act of 1958, as amended and recodified).

- FAA Modernization and Reform Act of 2012, Public Law No. 112-95 (Feb. 14, 2012), Subtitle B, "Unmanned Aircraft Systems."

Federal Regulations

- Title 14 of the Code of Federal Regulations, Chapter 1.

The U.S. Supreme Court

- "Congress has recognized the national responsibility for regulating air commerce. Federal control is intensive and exclusive. Planes do not wander about in the sky like vagrant clouds. They move only by federal permission, subject to federal inspection, in the hands of federally certified personnel and under an intricate system of federal commands. The moment a ship taxies onto a runway it is caught up in an elaborate and detailed system of controls. It takes off only by instruction from the control tower, it travels on prescribed beams, it may be diverted from its intended landing, and it obeys signals and orders. Its privileges, rights, and protection, so far as transit is concerned, it owes to the Federal Government alone and not to any state government." *Northwest Airlines v. State of Minnesota,* 322 U.S. 292, 303 (1944) (Jackson, R., concurring).

- "If we were to uphold the Burbank ordinance [which placed an 11 p.m. to 7 a.m. curfew on jet flights from the Burbank Airport] and a significant number of municipalities followed suit, it is obvious that fractionalized control of the timing of takeoffs and landings would severely limit the flexibility of FAA in controlling air traffic flow. The difficulties of scheduling flights to avoid congestion and the concomitant decrease in safety would be compounded." *Burbank v. Lockheed Air Terminal Inc*., 411 U.S. 624, 639 (1973).

- "The Federal Aviation Act requires a delicate balance between safety and efficiency, and the protection of persons on the ground ... The interdependence of these factors requires a uniform and exclusive system of federal regulation if the congressional objectives underlying the Federal Aviation Act are to be fulfilled." *Burbank* at 638-639.

- "The paramount substantive concerns of Congress [in enacting the FAA Act] were to regulate federally all aspects of air safety ... and, once aircraft were in 'flight,' airspace management...." *Burbank* at 644 (Rehnquist, J. dissenting).

U.S. Courts of Appeals

- "Air traffic must be regulated at the national level. Without uniform equipment specifications, takeoff and landing rules, and safety standards, it would be impossible to operate a national air transportation system." *Gustafson v. City of Lake Angeles*, 76 F.3d 778, 792-793 (6th Cir. 1996)(Jones, N., concurring).

- "The purpose, history, and language of the FAA [Act] lead us to conclude that Congress intended to have a single, uniform system for regulating aviation safety. The catalytic events leading to the enactment of the FAA [Act] helped generate this intent. The FAA [Act] was drafted in response to a series of fatal air crashes between civil and military aircraft operating under separate flight rules .... In discussing the impetus for the FAA [Act], the Supreme Court has also noted that regulating the aviation industry requires a delicate balance between safety and efficiency. It is precisely because of 'the interdependence of these factors' that Congress enacted 'a uniform and exclusive system of federal regulation.'" *Montalvo v. Spirit Airlines*, 508 F.3d 464, 471 (9th Cir. 2007), citing *City of Burbank v. Lockheed Air Terminal Inc*., 411 U.S. 624, 638-39 (1973).

- "[W]hen we look to the historical impetus for the FAA, its legislative history, and the language of the [FAA] Act, it is clear that Congress intended to invest the Administrator of the Federal Aviation Administration with the authority to enact exclusive air safety standards. Moreover, the Administrator has chosen to exercise this authority by issuing such pervasive regulations that we can infer a preemptive intent to displace all state law on the subject of air safety." *Montalvo* at 472.

- "We similarly hold that federal law occupies the entire field of aviation safety. Congress' intent to displace state law is implicit in the pervasiveness of the federal regulations, the dominance of the federal interest in this area, and the legislative goal of establishing a single, uniform system of control over air safety. This holding is fully consistent with our decision in *Skysign International, Inc. v. Honolulu*, 276 F.3d 1109 (9th Cir. 2002), where we considered whether federal law preempted state regulation of aerial advertising that was distracting and potentially dangerous to persons on the ground. In upholding the state regulations, we held that federal law has not 'preempt[ed] altogether any state regulation purporting to reach into the navigable airspace.' *Skysign* at 1116. While Congress may not have acted to occupy exclusively all of air commerce, it has clearly indicated its intent to be the sole regulator of aviation safety. The FAA, together with federal air safety regulations, establish complete and thorough safety standards for interstate and international air transportation that are not subject to supplementation by, or variation among, states." *Montalvo* at 473-474.

- "[W]e remark the Supreme Court's reasoning regarding the need for uniformity [concerning] the regulation of aviation noise, see *City of Burbank v. Lockheed Air Terminal*, 411 U.S. 624 (1973), and suggest that the same rationale applies here. In *Burbank*, the Court struck down a municipal anti-noise ordinance placing a curfew on jet flights from a regional airport. Citing the 'pervasive nature of the scheme of federal regulation,' the majority ruled that aircraft noise was wholly subject to federal hegemony, thereby preempting state or local enactments in the field. In our view, the pervasiveness of the federal web is as apparent in the matter of pilot qualification as in the matter of aircraft noise. If we upheld the Rhode

Island statute as applied to airline pilots, 'and a significant number of [states] followed suit, it is obvious that fractionalized control ... would severely limit the flexibility of the F.A.A **…**.' [citing *Burbank*] Moreover, a patchwork of state laws in this airspace, some in conflict with each other, would create a crazyquilt effect **…** The regulation of interstate flight-and flyers-must of necessity be monolithic. Its very nature permits no other conclusion. In the area of pilot fitness as in the area of aviation noise, the [FAA] Act as we read it 'leave[s] no room for ... local controls.' [citing *Burbank*]. *French v. Pan Am Express, Inc*., 869 F.2d 1, 6 (1st Cir. 1989).

TECH DRONE REGULATION

A Drone, a Shotgun, and the Future of Airspace Rights

by David Z. Morris @davidzmorris SEPTEMBER 25, 2016, 4:44 PM EDT

Drone inspecting roof for Allstate.

Jessica Leigh © Jessica Leigh Photography

A case with major legal implications is heading to court.

Reuters reports that one of the most anticipated court cases at the intersection of drone technology and property rights will get a court venue within a few weeks. In July of last year, Hillview, Kentucky's William Merideth spotted a drone flying near his property, and he did what any God-fearing American would do—he blew it to smithereens with his shotgun.

It turns out the drone belonged to Merideth's neighbor, David Boggs, a roofer. Boggs has filed a claim for damages against Merideth in Federal court, claiming in part that the drone was not trespassing. Merideth says it was hovering over his property and his daughter.

Merideth is unrepentant about his decisive response, telling Reuters that "I was reacting as most homeowners would, protecting their property, their kids." He has also reportedly taken to referring to himself as the "drone slayer."

The case seems almost surreal, since "What if someone takes it out with a shotgun?" has so frequently surfaced as a hypothetical in discussions of drone delivery and other applications. Some dismissed those concerns as hyperbolic, but they've come true—and legal observers think the outcome of the ensuing case could have serious implications for U.S. drone policy.

(Bonus footage: Drones have also been terminated with extreme prejudice by basketballs, t-shirts, and a spear, though no landmark legal cases seem to have emerged from those incidents.)

spear, though no landmark legal cases seem to have emerged from those incidents.)

Merideth, who comes across as much more level-headed than you might expect, told Reuters that he hopes "that laws can be put into place to protect not just the home owner but the individual who owns the drone. They have rights too. It is a huge gray area and for now nobody knows what they are allowed to do."

In a hearing last year, a Kentucky District Court Judge dismissed criminal charges against Merideth, saying he had a right to shoot at the aircraft. Boggs then pursued a civil case.

For more on drone regulation, watch our video.

There is currently little clarity about airspace usage rights under 400 feet, the FAA's altitude limit for small-drone operators. Though historically, the air above a property was often considered to be part of that property, the U.S. declared anything higher than 500 feet public airspace in the 1950s. Those regulations were triggered in part by the 1946 Supreme Court decision in United States v. Causby, in which a chicken farmer sued the government to limit military flights over his property.

The "drone slayer" case could lead to a reconsideration of that standard, or it could reaffirm it. If private property owners retain the right to limit drone access to their airspace—including, perhaps, via shotgun—it would represent a significant wrinkle for many of the most ambitious plans for putting drones to work.

INTERNATIONAL SYRIA

Russia Warns Against U.S. Attack on Syrian Forces

Syrian civil defence volunteers, known as the White Helmets, hand the body of a girl down to civilians on the ground as her father (striped purple shirt) mourns after she was pulled from the rubble following a government forces air strike on the rebel-held al-Shaer neighbourhood of the northern Syrian city of Aleppo on September 27, 2016. / AFP / AMEER ALHALBI (Photo credit should read AMEER ALHALBI/AFP/Getty Images)

AMEER ALHALBI AFP/Getty Images

U.S.-Russian tensions over Syria have escalated since the breakdown of a cease-fire last month.

Russia warned the United States Saturday against carrying out any attacks on Syrian government forces, saying it would have repercussions across the Middle East as government forces captured a hill on the edge of the northern city of Aleppo under the cover of airstrikes.

Russian news agencies quoted Foreign Ministry spokeswoman Maria Zakharova as saying that a U.S. intervention against the Syrian army "will lead to terrible, tectonic consequences not only on the territory of this country but also in the region on the whole."

stripes.

U.S.-Russian tensions over Syria have escalated since the breakdown of a cease-fire last month, with each side blaming the other for its failure. Syrian government forces backed by Russian warplanes have launched a major onslaught on rebel-held parts of the northern city of Aleppo.

Syrian troops pushed ahead in their offensive in Aleppo on Saturday capturing the strategic Um al-Shuqeef hill near the Palestinian refugee camp of Handarat that government forces captured from rebels earlier this week, according to state TV. The hill is on the northern edge of the Aleppo, Syria's largest city and former commercial center.

What Life is Like for the Children of War-Torn Aleppo

The powerful ultraconservative Ahrar al-Sham militant group said rebels regained control Saturday of several positions they lost in Aleppo in the Bustan al-Basha neighborhood.

State media said 13 people were wounded when rebels shelled the central government-held neighborhood of Midan.

Airstrikes on Aleppo struck a hospital in the eastern rebel-held neighborhood of Sakhour putting it out of service, according to the Britain-based Syrian Observatory for Human Rights and the Local Coordination Committees. They said one person was killed in the airstrike.

Opposition activist Ahmad Alkhatib described the hospital, known as M10, as one of the largest in Aleppo. He posted photographs on his Twitter account showing the damage including beds covered with dust, a hole in its roof and debris covering the street outside.

A doctor at the hospital told the Aleppo Media Center, an activist collective, that thousands of people were treated in the compound in the past adding that two people were killed in Saturday's airstrikes and several were wounded.

"A real catastrophe will hit medical institutions in Aleppo if the direct shelling continues to target hospitals and clinics," said the doctor whose name was not given. He said the whole hospital is out of service.

Opposition activists have blamed the President Bashar Assad's forces and Russia for airstrikes that hit Civil Defense units and clinics in the city where eastern rebel-held neighborhoods are besieged by government forces and pro-government militiamen.

On Friday, the international medical humanitarian organization Doctors Without Borders demanded that the Syrian government and its allies "halt the indiscriminate bombing that has killed and wounded hundreds of civilians—many of them children," over the past week in Aleppo.

"Bombs are raining from Syria-led coalition planes and the whole of east Aleppo has become a giant kill box," said Xisco Villalonga, director of operations for the group. "The Syrian government must stop the indiscriminate bombing, and Russia as an indispensable political and military ally of Syria has the responsibility to exert the pressure to stop this."

It said from Sept. 21 to 26, hospitals still functioning in Aleppo reported receiving more than 822 wounded, including at least 221 children, and more than 278 dead bodies—including 96 children—according to the Directorate of Health in east Aleppo.

For more on Syria, watch:

Sweden's Foreign Minister Margot Wallstrom criticized attacks on civilian targets writing on her Twitter

In the eastern province of Deir el-Zour, warplanes of the U.S.-led coalition destroyed several bridges on

the Euphrates river, according to Syrian state news agency SANA and Deir el-Zour 24, an activist media collective. The province is a stronghold of the Islamic State group.

SANA said that among the bridges destroyed was the Tarif Bridge that links the eastern city of Deir el-Zour with the northern Syrian city of Raqqa, the extremists' de-facto capital.