DRONE CRASHES TO LEARN FROM

Rupprecht Law P. A.

- Rupprecht Law P.A. and drone law for 10 years.
- Attorney who focuses ONLY on drone law.
- Commercial Pilot & Flight Instructor (CFI/CFII)
- Contributor at Forbes.com for aerospace.
- 180+ waivers (BVLOS, over people, etc.)
- 600+ Exemptions Approved

Educational Purposes Only

This is not legal advice. I'm not your attorney.

Do your own due diligence.

Law and data are constantly changing.

LEARNING FROM THE PAST

- It's free.
- There are no deductibles.
- Is saves you money, time, and pain.
- It prevents you from hurting others or yourself.

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HOW CAN YOU USE THIS?

- What sparked this talk?
- Teach students and pilots.
- Great for written exams.
- You can read out loud and have the student spot the first link in the accident chain.
- You can also just read the entire story and have the student explain all of the hazards and all of the mitigations to counter the particular hazard.

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IMPORTANT POINTS

- These are all real crashes.
- I scrubbed people's names
- I also didn't put the make/model of aircraft.
- I edited some of the stories to make them more to the point.
- These slides are at my website. The QR codes takes you to website.

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CRASH #1

An unmanned aircraft system (UAS), . . . , sustained minor damage when it was involved in an accident . . . . An individual was seriously injured after being struck by the unmanned aircraft. The UAS was operated as a Title 14 Code of Federal Regulations Part 137 agricultural flight. The remote pilot reported that the unmanned aircraft was landing at the previously designated GPS coordinates. The aircraft had reached the landing spot and descent height. However, when it was about one foot above the ground, the aircraft went sideways about 30 feet and struck an individual assisting with the operation. That individual sustained a broken shoulder. The unmanned aircraft sustained damage to one rotor blade and to the onboard radar assembly[.]"

DISCUSSION

- Ground crew should always be near something solid to stop a drone such as trailer, truck, tree, etc.
- Don't turn your back on a drone when it's taking off or landing.

CRASH #2

Pilot stated they had already done a test flight and were loading the first load of chemicals to spray for the day. Pilot stated the loading site was about 500 feet from their starting point. pilot stated they took the drone off and brought the drone to a stable hover. **Pilot stated that as they were repositioning themselves, the drone began a slow descent.** Pilot stated by the time they realized the drone was descending, it had descended below the tops of the vines. . . . Pilot stated they tried to recover the aircraft, but the drone was entangled in vines and they couldn't make it climb. The pilot stated the drone the main rotor struck a support pole and the helicopter settled crossways between rows with significant damage to main rotor blades, tail rotor, land skids and cowl. Pilot stated there were no chemical, fuel, or oil spills and no injuries or significant property damage.

DISCUSSION

- Notice that it said as they were repositioning themselves.
- You should try and keep eyes on the drone and the sky as much as possible.
- This is a failure to continue proper scan.

CRASH #3

A UAS HIT A POWER LINE IN...CALIFORNIA. THE OPERATOR OF THE UAS WAS AN OFFICER FOR . . .POLICE DEPARTMENT ASSISTING . . . TRACKING A POTENTIAL SUSPECT. THE OFFICER AND HIS OBSERVER, HIS SUPERVISOR, DECIDED TO MOVE TO A NEW LOCATION IN ORDER TO ATTEMPT TO GET TO ANOTHER VANTAGE POINT TO BETTER LOCATE THE SUSPECT. AFTER RELOCATING, THE OFFICER LAUNCHED THE DRONE AND THE UAS STRUCK THE POWER LINE DURING ITS INITIAL CLIMB. THE OFFICER STATED THE AREA WAS NOT WELL LIT AND BOTH HE AND IS OBSERVER WERE RUSHED TO LOCATE THEIR SUSPECT. NEITHER NOTICED THE POWER LINES ABOVE THEM DURING THEIR QUICK SURVEY OF THE AREA. UPON REALIZING THE UAS STRUCK THE POWERLINE THE OFFICERS REPORTED THE INCIDENT. THE LOCAL POWER COMPANY WAS DISPATCHED AND THE POWER LINE WAS REPAIRED.

DISCUSSION

- The officers had external pressure to catch the bad guy and this caused them to not take their time.
- Things hide in the dark. Did you preflight the area during the day or did you sufficiently illuminate it during the night?
- Check your surroundings PRIOR to launch. Please look up.

CRASH #4

DRONE . . . TOOK OFF FROM A LOCATION ON THE SHORE OF A BODY OF WATER KNOWN LOCALLY AS "GLACIER LAKE". THE DRONE OPERATOR WAS A CUSTOMER OF AN ATV TOUR COMPANY AT THE KNIK GLACIER. THE MOTOR TOUR GROUP STOPPED AT A KNOWN STOPPING LOCATION FOR CUSTOMERS TO TAKE PHOTOS AND EAT. THE DRONE OPERATOR LAUNCHED THE DRONE FROM A LOCATION AT THE BOTTOM OF A 50 FOOT BLUFF NEXT TO THE WATER FOR THE PURPOSES OF TAKING PICTURES AND VIDEO OF A FAMILY EVENT. AFTER TAKEOFF, THE DRONE OPERATOR CLIMBED THE DRONE TO 94 FEET AGL AND FLEW THE DRONE OVER THE WATER ABOUT 200 FEET TO THE SOUTH. AT 1 MINUTE INTO THE FLIGHT, THE DRONE WAS AT 86.9 FEET AGL AND 194 FEET FROM THE TAKE-OFF POINT MOVING TOWARDS THE OPERATOR. A HELICOPTER FLEW OVER A BLUFF FROM BEHIND AND TO THE LEFT THE DRONE OPERATOR. THE HELICOPTER EXECUTED A RIGHT APPROXIMATELY 180 DEGREE TURN OVER THE WATER AT 80 FEET AGL. ABOUT HALF WAY THROUGH THE TURN THE DRONE IMPACTED THE LEADING EDGE OF THE HELICOPTER MAIN ROTOR BLADE. THE DRONE WAS DISTROYED AND THE VEHICLE PARTS WERE LOST IN THE LAKE.

DISCUSSION

- This one was really hard to try and prevent. The manned helicopter came up over the bluff really quickly.
- In locations where sightseeing with a manned aircraft is a possibility, you should be extra vigilant.
- One possibly mitigation was to place a visual observer in a place to see beyond the bluff so there were no blind spots.
- You could also try and monitor any VHF frequency for the area. (Like the CTAF).
- VHF Freq. 122.925 can be monitored for ag aircraft.

CRASH #5

AIR TRAFFIC CONTROL TOWER (ATCT) PROVIDED . . . AUTHORIZATION TO . . . PERFORM SUAS OPERATIONS IN . . . CLASS D AIRSPACE. WIND SPEED WAS 7 KNOTS WITH GUSTS AT 14 KNOTS. WIND DIRECTION 060. . . . RPIC WAS OPERATING WITH ONE INEXPERIENCED VISUAL OBSERVER (VO). RPIC WAS NOT ACCUSTOMED TO OPERATING THE SMALL UNMANNED AIRCRAFT CONTROLS, MANIPULATING THE CAMERA/GIMBLE COMBINATION SET UP, AND COMMUNICATING TO ATCT VIA RADIO SIMULTANEOUSLY. RPIC WAS ALSO WORKING WITH AN INEXPERIENCED VO. RPIC BECAME TASK SATURATED AND LOST SIGHT OF THE SMALL UNMANNED AIRCRAFT. . . . THE SMALL UNMANNED AIRCRAFT STRUCK THE WEST SIDE OF. . . [the Air traffic control tower. Some guy] SUSTAINED A SUPERFICIAL HORIZONTAL LACERATION TO HIS RIGHT LOWER, INSIDE FOREARM. HE WAS TREATED ON-SCENE WITH BANDAGE AND GAUZE WRAP.

DISCUSSION

- Inexperienced visual observer.
- RPIC was not used to flying this drone.
- Pilot was overwhelmed with flying this unfamiliar small drone and talking to ATCT.
- Would have been better to have an experienced person manipulating the control while the RPIC told the (PMC) so the RPIC could focus on communicating with the ATCT.

CRASH #6

A LAW ENFORCEMENT DRONE CONDUCTING A LAWFUL MISSION . . . WAS SHOT DOWN AT APPROX. . . . REMOTE PILOT . . . WAS PILOTING . . . DRONE . . . IN AN OVERWATCH MISSION TO PRELIMINARILY CLEAR A LARGE (10 ACRE) WAREHOUSE COMPLEX THAT HAD BEEN BURGLARIZED. JUST BEFORE THE FLIGHT ENDED, TWO SHOTS WERE FIRED AT THE DRONE. IT APPEARS THAT ONE OF THOSE SHOTS STRUCK THE DRONE IN ITS LIPO BATIERY CAUSING AN IMMEDIATE FIRE ONBOARD THE DRONE. [PILOT] ATTEMPTED TO MANUEVER THE DRONE INTO AN OPEN LANDING AREA WITHOUT SUCCESS AS THE RETURN TO HOME FEATURE AND AUTO LANDING SEQUENCES HAD INITIATED DUE TO RAPID LOSS OF BATTERY POWER. THE DRONE CRASHED ON THE ROOF OF A NEARBY METAL BUILDING AND SLID DOWN DUE TO THE PITCHED ROOF WHERE IT GOT CAUGHT ON A RAIN GUTTER AND INVERTED ITSELF OFF OF THE ROOF, INADVERTENTLY SUSPENDING ITSELF AWAY FROM THE BUILDING WHILE IT BURNED OUT. THE DRONE WAS A TOTAL LOSS (30K) HOWEVER, NO OTHER DAMAGE OCCURRED TO ANY NEARBY PROPERTY, STRUCTURES OR PEOPLE.

DISCUSSION

- Do you have a fire extinguisher?
- If your drone gets shot, there is a good chance of a fire starting.
- You'll also have rapid power loss you need to quickly figure out how to ditch it into an area free of people.
- Part of your pre-flight is figuring out ditching areas.

FAQS

I crashed my drone. What should I know about?

- 49 CFR 830.5 has **IMMEDIATE** reporting requirements (fly-aways, in flight fire, damage to property greater than $25k, serious injury to someone). There is duty to preserve the wreckage. See 830.10.
- Exemptions have reporting requirements "Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported within **24 hours** as required by the applicable COA issued by the FAA ATO. Additionally, any incident or accident that occurs, or any flight operation that transgresses the lateral or vertical boundaries of the operational work area, must be reported to 137 UAS Operations Office at UAS137Certificates@faa.gov."
- 14 CFR 107.9 has reporting requirements for serious injury or cost to repair or replace damaged property is greater than $500. Reporting must be done **within 10 days.**
- NASA Report (**filed within 10 days**).

FAQS

I crashed my drone. What should I know about?

- NTSB is immediate. Exemption is 24 hours. Part 107 and the NASA report are within 10 days.
- Making one report does NOT count towards fulfilling the reporting reports elsewhere.
- Attorney client privilege applies to licensed attorneys, not to consultants and other aviation professionals.
- Exemption manuals are required to have accident reporting information. Where did you get your manuals?

FAQS

I'm just going to crash with no one in the area. What's the worst that could happen?

- The drone crashes way over yonder and it's a good size fire by the time you get there. Can you call 911 while running with one or two fire extinguishers?
- University researchers crashed a drone. The wildfire quickly grew to about 52 acres, forcing evacuations.
- A drone malfunctioned and crashed. The ensuing blaze scorched 25 acres and was extinguished by the local fire department.

Questions?

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