



# Interagency Aviation Lessons Learned



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Subject: Unmanned Aircraft Systems (UAS) Operations

Area of Concern: Safety Procedures

Distribution: All Aviation Activities

**Discussion:** During a recent UAS training event, an airborne Raven UAS struck and bruised the upper shoulder of a student standing near the intended area of recovery. The Raven weighs 4.2 lbs and flies at speeds up to 50 mph. At 20 mph, it has an impact force of 56 pounds. At 50 mph, the Raven has an impact force of 351 pounds.

To put it in perspective, imagine being hit by a Randy Johnson fastball traveling at 102 mph (the equivalent kinetic energy of the Raven flying at 30 mph). Such an impact can cause personal injury. Fortunately, the student wasn't hit in the head as the mishap could have resulted in traumatic brain injury or death.



PITCH SPEED 102

The era of UAS in DOI and USFS has begun. UAS technology possesses the ability to significantly expand our ability to obtain remote data critical to fulfilling many mission requirements safer, with less cost, and less environmental impact. Just a few such missions include:

- \* Wildfires
- \* Wildlife Monitoring
- \* Law Enforcement
- \* Hydrology
- \* Geological surveys
- \* Geophysical surveys
- \* Volcanic activity

One of the most important things to remember is that **UAS are aircraft**. As such, **most of the same rules and regulations relating to their acquisition and operation apply**. UAS aviation operations should be planned and conducted with an equivalent consideration to mishap prevention as manned aircraft. Small UAS are operated in the low level environment which normally require aviation project safety plans in order to identify and mitigate hazards. Risk assessments of these hazards can be identified through maps, aerial photos, or Google earth to help map their location.

A significant amount of engineering and other safeguards are built into airfield design and operations. Unfortunately, much of this is abandoned or simply unavailable in the small UAS environment. As a result, it's up to operators to ensure similar safeguards are implemented such as "clear zones" around the vehicle and its intended flight path that's briefed prior to every mission with a mechanism for **assuring compliance**. Additionally, every UAS operating outside of restricted or military controlled airspace requires a Certificate Of Authorization (COA) from the FAA . COAs are centrally managed by both DOI and USFS and often contain additional operating and reporting requirements unique to that operation.

Effective October 25, 2010, 49 CFR Part 830 (NTSB Notification and Reporting of Aircraft Accidents or Incidents and Overdue Aircraft, and Preservation of Aircraft Wreckage, Mail, Cargo, and Records) Sec. 830.2 was amended by adding the following sentence at the end of the definition of "aircraft accident" and adding a new definition of "unmanned aircraft accident":

*Unmanned aircraft accident means an occurrence associated with the operation of any public or civil unmanned aircraft system that takes place between the time that the system is activated with the purpose of flight and the time that the system is deactivated at the conclusion of its mission, in which:*

- (1) Any person suffers death or serious injury; or*
- (2) The aircraft has a maximum gross takeoff weight of 300 pounds or greater and sustains substantial damage.*

For DOI operations, **any** mishap with a UAS must be reported in accordance with 352 DM 6.5 and the Interagency Aircraft Mishap Notification, Investigation and Reporting Handbook. USFS personnel should follow FSM 5723.22 Mishap Reporting. Additionally, all reporting requirements contained within 49 CFR 830.5 apply to UAS operations **including the operating station.** Also, don't forget the SAFECOM system is always available for reporting any safety related issue.

Once again, **UAS are aircraft**. UAS procurement follows the same procedures as aircraft procurement. DOI UAS pilots, mission operators and observers will be certified IAW OPM 09-11 and USFS personnel are required to comply with FSM 5713.7. Maintenance inspectors for UAS will be required to possess similar qualifications as current AMD/USFS inspectors in addition to knowledge of UAS procedures.



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