NM 7900-83
NPR 7900.3B

November 10, 2009

Office of Infrastructure

TO: Center Flight Aviation Directors

FROM: Office of Infrastructure

SUBJECT: NASA Interim Directive (NID): Unmanned Aircraft System (UAS) Policy Update

The purpose of this NID is to issue interim requirement changes to NASA Procedural Requirement (NPR) 7900.3B, NASA Aircraft Operations Management Manual, with respect to Unmanned Aircraft System (UAS) policy.

This NID shall be in effect for one year from the date of this memorandum, or until the release of an update to NPR 7900.3B, whichever occurs first. This NID applies to NASA Headquarters and NASA Centers, including Component Facilities.

This NID will be incorporated in addition to all requirements of the current manual, which remain in effect.

As discussed in NPR 7900.3B, Chapter 5, a UAS is a powered aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, and can fly autonomously or be piloted remotely. UASs range from micro vehicles measuring inches in size and ounces in weight to large aircraft weighing more than 30,000 pounds.

The attached Classification Matrix reflects the collaborative effort of the Inter-Center Aviation Operations Panel to further refine and update NASA's set of UAS requirements. There are three sections to the matrix: NASA UAS vehicle classification requirements, UAS Pilot and Observer requirements and UAS definitions. Each section of the matrix updates the requirements listed in Chapter 5 of NPR 7900.3B.

These changes take effect upon the date of signature. Questions regarding this NID should be forwarded to Mr. Joseph Walker at (202) 358-4637.

NASA UAS Classification Matrix

Category	I	II	III
Weight (lb)	**≤ 55**	**55-330**	**> 330**
Airspeed (kt)	**≤ 70**	**≤ 200**	**> 200**
Type	**Model or sUAS**	**sUAS**	**UAS**
Airworthiness & Flight Safety Review	Ops in NAS: Must comply with NASA and FAA requirements.		
	Ops in SUA: Commercial off-the-shelf models and sUAS receive flight approval via NASA Center airworthiness and flight safety review process. All NASA and NASA hosted aircraft must have an airworthiness statement and flight release.		Ops in SUA: NASA Center airworthiness and flight safety review and a flight readiness review are required. Subsequent system modifications requires technical review and FRR/AFSRB in accordance with Center requirements. All NASA and NASA hosted aircraft must have an airworthiness certificate and flight release.
Maintenance	Only requirements levied on by the FRR/AFSRB to correct deficiencies will be required for this category of aircraft.	sUAS aircraft in this category typically operate on a fly to failure maintenance schedule. Flight critical parts will be inspected at least once per day prior to flight activities - normally accomplished during the first preflight of the day. An appropriate maintenance inspection schedule will be developed for critical components. Individual aircraft log books will be maintained for each aircraft.	Aircraft maintenance will be accomplished in accordance with NPR 7900 and applicable NASA guidance.
Range Operations	Ops in NAS: Must comply with NASA and FAA requirements.		
	All operations are visual LOS and will be conducted under approved local range safety authority or FAA model aircraft rules.	LOS flight operations at any authorized operations area or as identified and approved by local range safety authority. BLOS flight operations IAW Center approved requirements. BLOS daisy chain flight operations are authorized if observer qualifications meet NASA requirements.	LOS and BLOS flight operations in accordance with Center approved requirements. Range safety review and approval required.

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Type	**Model or sUAS**	**sUAS**	**UAS**
Mishap Reporting	Ops in NAS: Must comply with NASA and FAA Certificate of Authorization requirements.		
	Only requirements levied on by the FRR/AFSRB will be required for this category of aircraft, except for cases in which the aircraft caused injury to people or property reaching NPR 8621.1 thresholds.	System safety analysis will be an integral part of system operation. A hazard analysis and accepted risk list will be developed. The Center flight safety office will review and approve the analyses. Mishap reporting in accordance with NPR 8621.1.	Accomplished in accordance with NPR 7900, NPR 8621.1 and applicable NASA and Center developed reporting procedures.
Flight Termination System	Not Required with reliable commercial RC Controller	Required unless a the command and control system has proven reliability using actual flight data or a proven, regularly exercised Lost Link capability. Commercial RC controllers do not require a FTS.	
Waiver Authority	IAW NPR 7900 and applicable NASA HQ approved Center guidelines.		
Oversight Responsibilities	In accordance with NPR 7900		

NASA UAS Pilot/Observer

Category	RC Pilot	Pilot-Operator	Remote Pilot
Crew Qualifications	Ops in NAS: Must comply with NASA and FAA requirements.		
	RC Pilots require a certificate of qualification identifying completion of an appropriate Center, company or military developed and HQ\AMD approved flight training course. Must complete a flight check (in accordance with Center developed guidelines) demonstrating competency in similar type aircraft (rotorcraft and fixed-wing aircraft apply to this requirement).	Pilot-Operators require a certificate of qualification identifying completion of an appropriate Center, company or military developed and HQ/AMD approved flight training course.	Remote Pilots must meet the minimum qualifications for a NASA pilot based on NPR 7900 and in accordance with Center established processes and procedures.
Medical Qualifications	Ops in NAS: Must comply with NASA and FAA requirements.		
	RC pilots require a current FAA Third Class Pilot Medical Certificate or a NASA Third Class Medical Exam.	Pilot-Operators require a current FAA Third Class Pilot Medical Certificate or a NASA Third Class Medical Exam.	Remote Pilots require a current FAA First Class Pilot Medical Certificate, a NASA First Class Medical Exam or a military flight physical exam.
Training	Ops in NAS: Must comply with NASA and FAA requirements.		
	Initial pilot training must include either completion of FAA private pilot written exam or completion of a Center developed and HQ/AMD approved training plan. Continuing training plan is Center developed and Chief of Flight Ops approved. Training will be documented and maintained in accordance with NPR 7900.	Initial pilot training must include either completion of FAA private pilot written exam or completion of a Center developed and HQ\AMD approved plan. Continuing training plan is Center developed and Chief of Flight Ops approved. Training will be documented and maintained in accordance with NPR 7900.	Initial pilot training must meet minimum NASA Pilot training requirements. Continuing training plan is Center developed and Chief of Flight Ops approved based on NPR 7900. Training will be documented and maintained in accordance with NPR 7900.

NASA UAS Pilot/Observer

Category	RC Pilot	Pilot-Operator	Remote Pilot
Currency	Ops in NAS: Must comply with NASA and FAA requirements.		
	RC Pilots are not required to maintain currency in a manned A/C, but must meet Center approved currency requirements for the type/category UAS being flown. Each Center will document and maintain currency requirements in accordance with NPR 7900.	Pilot-Operators will meet Center approved currency requirements for the type/category UAS being flown. As a minimum, three (3) Center approved qualifying currency events must be accomplished in the preceding 90 days. Each Center will document and maintain currency requirements in accordance with NPR 7900.	Remote Pilots must meet the minimum currency requirements for a NASA pilot IAW NPR 7900 and Center approved procedures. Each Center will document and maintain currency requirements in accordance with NPR 7900.
Waiver Authority	In accordance with NPR 7900 and applicable NASA HQ approved Center guidelines.		
Oversight Responsibilities	In accordance with NPR 7900		

NASA UAS Pilot/Observer

Category	Observer
Crew Qualifications	Ops in NAS: Must comply with NASA and FAA requirements.
	NASA (Civil Servant and NASA contractor) Observers require a certificate of qualification identifying completion of an appropriate Center, company or military developed and Center approved flight training course and must meet FAA observer requirements . Hosted Observers must identify qualifications in a questionnaire satisfactorily for the Center hosting. Partnerships present a subset of Hosted mode.
Medical Qualifications	Ops in NAS: Must comply with NASA and FAA requirements.
	Observers require a current FAA Second Class Pilot Medical Certificate or a NASA Second Class Medical Exam.
Training	Ops in NAS: Must comply with NASA and FAA requirements.
	Initial observer training must include either completion of FAA private pilot written exam or completion of a Center developed and Chief of Flight Ops approved based on NPR 7900. Continuing training plan is Center developed and Chief of Flight Ops approved. Training will be documented and maintained in accordancw with NPR 7900.

NASA UAS Pilot/Observer

Category	Observer
Currency	Ops in NAS: Must comply with NASA and FAA requirements.
	TBD
Waiver Authority	In accordance with NPR 7900 and applicable NASA HQ approved Center guidelines.
Oversight Responsibilities	IAW NPR 7900

NASA UAS Definitions

Definitions	
Weight	Based on maximum takeoff gross weight (in pounds) for each UAS type.
Airspeed	Operational limitation for Class I type UAS (limited by maximum engine control unit (ECU) thrust setting, ECU speed limiter, autopilot limit setting or airspeed callout from a reliable source) due to aircraft performance capabilities. Class II type UAS as identified in the operating manual and per FAA regulations.
LOS	Line of sight (LOS). Typically associated with RF communication direct link limitation between a transmitter and receiver. May also refer to visual line of sight (VLOS) between the controlling pilot and an unmanned aircraft.
BLOS	Beyond line of sight (BLOS). Typically refers to communication link protocols that enable unmanned aircraft command and control outside of a direct link between a transmitter and a receiver.
Remote Pilot	Remote Pilot (also called Remotely Operated Aircraft (ROA) or Remotely Piloted Vehicle (RPV) Pilot) is an individual who operates an unmanned aircraft system by means of manual control in a remotely located ground control station. The Remote Pilot typically manages the unmanned aircraft flight path through a command and control communication link using manual stick-and-rudder inputs, a forward looking video camera feed and a moving map display system located in the ground control station. The Remote Pilot is the designated pilot in command of the unmanned aircraft.
Pilot-Operator	Pilot-Operator (also called Ground Control Operator (GCO) or Internal Pilot) is an individual who manages the operation of an unmanned aircraft by means of a remote flight control station (also called ground control station or GCS). The Pilot-Operator typically controls the unmanned aircraft autonomously by means of computer interface with an onboard flight management system (fly-by-mouse) through a command and control communication link. The Pilot-Operator is the designated pilot in command of the unmanned aircraft.
RC Pilot	Radio Control (RC) Pilot (also called Safety Pilot or External Pilot) is an individual who operates an unmanned aircraft by means of a remotely located, manually operated radio controlled flight management system (direct control by means of stick-to-surface interface). The flight controller is typically commercial off-the-shelf RC hobby equipment. Radio frequencies associated with the command and control function of the system are typically in the unlicensed spectrum suite (72 MHz, 900 MHz or 2.4 GHz). The RC Pilot is the designated pilot in command of the unmanned aircraft. An RC Pilot may also perform crew member duties of a safety (or external) pilot who acts as a fail safe to an unmanned aircraft system that is normally controlled by a Pilot-Operator. The safety (or external) pilot flight control system is typically commercial off-the-shelf RC hobby equipment that may be either stand alone or modified to function as a buddy box. In the buddy box configuration, the safety (or external) pilot controls the unmanned aircraft through the ground control station communication link protocol. When the safety (or external) pilot is controlling the unmanned aircraft that person is considered the pilot in command. All flight operations are within visual line of sight of the controlling pilot.

NASA UAS Definitions

Observer	An individual who is a primary crew member for UAS flight operations. The observer serves as the flight safety monitor to ensure non-interference between the unmanned aircraft and non-participating aircraft by means of see and avoid. The observer may perform these duties either on the ground or in a chase aircraft while in direct communication with the controlling pilot. Daisy chain observer operations are limited to 5 NM between the pilot in command and the airborne unmanned aircraft.
UAS	An unmanned aircraft system (UAS) is any airborne vehicle without a pilot onboard that is controlled autonomously by an on-board control and guidance system or is controlled from a monitoring station outside of or remote from the UAS vehicle. UAS can also be operated via a remotely located, manually operated flight control system.
sUAS	Small Unmanned Aircraft System (sUAS) is a model or sub-scale aircraft designed and built to operate with an onboard flight management system. Small UAS may carry a variety of payloads and operate using either licensed or unlicensed spectrum for command and control. sUAS can be operated via a manual control, manually via an onboard flight management system or autonomously.
Model Aircraft	A sub-scale aircraft built from balsa wood, plywood, foam or other lightweight materials that is typically flown by means of a commercial off-the-shelf RC flight controller. Model aircraft are designed to be operated within visual line of sight of the controlling pilot. Model aircraft typically operate at a TOGW less than or equal to 55 lb.
FRR/AFSRB	Flight Readiness Review (FRR) / Airworthiness and Flight Safety Review Board (AFSRB) is a group of cognizant, senior-level decision makers who review and evaluate the airworthiness and flight safety of a given airborne capable system. The board receives a technical presentation from the FRR with rebuttal from project personnel. Subject material reviewed include (but not limited to): project description, operations summary, aircraft/experiment development status/readiness, ground system readiness, analyses/simulations, system safety analysis, schedule, configuration control board actions, issues/project requests. The board is typically led by the Chief Engineer and the board recommends approval to the Center Director who is the final authority for approving project flight operations.
Flight Termination System (FTS)	A flight termination system (FTS) may be dependent, independent or self initiated. A dependent FTS uses its own command and control system to either automatically self-terminate or allow a remote pilot to terminate flight. An independent FTS contains a fully independent transmitter / receiver located onboard the aircraft that is activated remotely typically by a range safety officer. Self FTS are typically associated with COTS RC controllers that are activated upon lost link.
Special Use Airspace (SUA)	Special use airspace consists of that airspace wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of those activities, or both. Except for controlled firing areas, special use airspace areas are depicted on aeronautical charts.