

		ASN	2011-WSA-107-COA
		Case Status	APPROVED_EXT
		Date Created	09/13/2011
		Date Submitted	10/12/2011
Proponent Organization		Sponsor	U.S. Army Aeroflightdynamics Directorate
		Attn Of	(b) (6)
		Address	Bldg N248, Room 220
		Address2	NASA Ames Research Center
		City	Moffett Field
		State	CA
		Postal Code	94035
		Telephone	(650) 604-3505
		Email	(b) (6)
Declaration		Declaration(a)	Yes
		Declaration(b)	Yes
Point of Contact		Representative	(b) (6)
		Address	Bldg N248, Room 220
		Address2	NASA Ames Research Center
		City	Moffett Field
		State	CA
		Postal Code	94035
		Telephone	(650) 604-3505
		Email	(b) (6)
Operational Description	Requested Effective Period	Beginning	
		End	
		Light out operation	No
		VFR operation	Yes
		IFR operation	No
		Day operation	Yes
		Night operation	No
		Program Executive Summary	The U.S. Army Aeroflightdynamics Directorate (AFDD) Autonomous Rotorcraft Project (ARP) previous operated under NASA oversight with COA #2009-WSA-12, the Current COA in effect is COA #2009-WSA-91. Research topics for the ARP include mission planning, autonomous landing, and obstacle field navigation for helicopter UAV operating at low-altitude in cluttered environments.
		Operational Summary	The RMAX helicopters are operated at 1,000 ft MSL and below within the Moffett Federal Airfield (KNUQ) Class D airspace in daytime, VFR conditions. The RMAX helicopters are flown one at a time, no multi-UAS operations are conducted. Over the past six years, the aircraft have flown an average of 50 hours per year.
	Location	State	CA
		County	Santa Clara
		Nearest Airport	MOFFETT FEDERAL AFLD
		AOR	California - Northern
	Class Of Airspace	Class-A	
		Class-B	
		Class-C	
		Class-D	Yes
		Class-E	
		Class-G	
System Description		Aircraft Type	102154764 - RMAX
		Aircraft Type And Model Description Attachment	1
		Control Station Attachment	1
		Communications System Attachment	1
		List Certified Components (TSO) Attachment	1
		Other Attachment	0
Performance Characteristics		Climb Rate (feet/Minute)	400
		Descent Rate (feet/Minute)	400
		Turn Rate (Degrees/Second)	20.0
	Cruise Speed	Maximum	40
		Minimum	0
		Approach Speed	0
	Operating Attributes	Maximum MSL	1000
		Minimum MSL	0
		Gross Takeoff Wt	200.0
		Launch/Recovery Attachment	1
Airworthiness		FAA Type Certificate	

		If No FAA Certificate (Public Aircraft Only) Attachment	1
Procedures		Lost Link/Mission Procedures Attachment	1
		Lost Communications Procedures Attachment	1
		Emergency Procedures Attachment	1
Avionics/Equipment		Equipment Suffix Type	X
		GPS	Yes
		Moving map indicator (Command Station)	Yes
		Tracking capability	No
		TCA/MCAS	No
		ELT	No
	Transponder	Transponder	No
		On	
		Off	
		Standby	
		Ident	
		Mode S	
		Mode C	
		Transponder Retuneable in Flight	
Lights		Landing	No
		Position/Navigation	No
		Anti-collision	No
		Infrared (IR)	No
Spectrum Analysis Approval		Data Link	Yes
		Data Link Attachment	0
		Control Link(s)	Yes
		Control Link Attachment	0
		Operations utilizing Radio Control (R/C) frequencies as described in Title 47 CFR 95	No
		NTIA/FCC Authorization Attachment	1
ATC Communications	Transmitter VHF Band	VHF Band	No
		Quantity	
		In-Flight Retunable	No
	Transmitter UHF Band	UHF Band	Yes
		Quantity	3
		In-Flight Retunable	Yes
	Transmitter HF band	HF Band	No
		Quantity	
		In-Flight Retunable	No
	Receiver VHF Band	VHF Band	No
		Quantity	
		In-Flight Retunable	No
	Receiver UHF Band	UHF Band	Yes
		Quantity	3
		In-Flight Retunable	Yes
	Receiver HF band	HF Band	No
		Quantity	
		In-Flight Retunable	No
	Guard (Emergency) Frequencies VHF Band	VHF Band	No
		Quantity	
	Guard (Emergency) Frequencies UHF Band	UHF Band	Yes
		Quantity	1
	Instantaneous Two-Way Voice	Direct to pilot	Yes
		SATCOM	No
		Relay via aircraft	No

Electronic Surveillance/ Detection Capability		EO/IR	No
		Terrain detection	No
		Weather/icing detection	No
		Radar	No
		Other Attachment	0
		Electronic detection systems	No
		Electronic detection systems attachment	0
		Radar observation	No
		NAS Operational Capability Attachment	0
Visual Surveillance/ Detection Capability	Maximum Distance from UA	Vertical	1000 Feet
		Horizontal	0.25 Nautical Miles
		Airborne based (Chase Aircraft)	Yes
		Ground based	Yes
		Visual observation from one or more ground sites	Yes
		Forward or side looking cameras	No
		Attachment for All	1
Aircraft Performance Recording		Flight data recording	Yes
		Control station recording	Yes
		Voice Recording	Yes
Flight Aircrew Qualifications	Pilots	Private (Written)	Yes
		Private (Certified)	Yes
		Instrument	No
		Commercial	No
		Air Transport	No
		Unique Trained Pilot	No
		Unique Trained Pilot Description	DOD Certified
		DOD certified/trained	Yes
		Other Certified Training	Yes
		Trained on FAR Part 91 Requirement	Yes
		Medical Certification Class (FAA or DOD equivalent)	2
		Currency Status	DOD Certified
		Duty Time Restrictions	12 hours
		Single UAS Control	Yes
		UAS Description	
		Total Numbers of UAS Controlled	1
	Observers	Private (Written)	No
		Private (Certified)	No
		Instrument	No
		Commercial	No
		Air Transport	No
		Unique Trained Pilot	No
		Unique Trained Pilot Description	DOD Certified
		DOD certified/trained	Yes
		Other Certified Training	Yes
		Trained on FAR Part 91 Requirement	Yes
		DOD Certified Training Attachment	0
		Medical Certification Class (FAA or DOD equivalent)	2
		Currency Status	DOD Certified
		Duty Time Restrictions	12 hours
		Single UAS Control	Yes
		UAS Description	
		Total Numbers of UAS Controlled	1

Special Circumstances		Special Circumstances	<p>UPDATE: 13 September 2011 - Request waiver to Special Provision #11 of 2009-WSA-91 which restricts RMAX operations to operating at distances greater than 500 ft from power lines in order to conduct autonomous flight research in the Moffett Federal Airfield Disaster Assistance Rescue Training site which provides an excellent location for Obstacle Field Navigation and Safe Landing Area Determination flight development. Expanded explanation/justification included in Attachment 13 - Special Circumstances, paragraph. The RMAX UAS were previously operated within the DART site under 2008-WSA-12-COA.</p> <p>UAS COA #2008-WSA-12 was issued to NASA, but the oversight of the ARP has changed to the U.S. Army. There are no other modifications requested to the previous UAS COA. The ARP has been operating the two RMAX helicopters and conducting autonomous flight research at Moffett Federal Airfield since 2001. Four prior UAS COAs have been issued for this operation.</p> <p>Request waiver to 91.215 since the RMAX operating area is within the Mode C veil for SFO, but the RMAX is not transponder equipped. Previous COAs have been approved for operation at NUQ as long as the UAS can be controlled by two redundant control links on different frequencies. The RMAX can be controlled by the ground station on 900 MHz or by the External Pilot on 72 MHz.</p> <p>UPDATE: 4 December 2009 - Corrections made: 1. Altitude correction made to Flight Operations Area/Plan. Correction: Changed maximum altitude to 1000' MSL. 2. Spectrum Analysis Approval Document. Correction: Deleted previous approval document. Inserted Spectrum Analysis Approval issued by NTIA to the U.S. Army AFDD.</p>
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Flight Operations Area/Plan

Type	User Defin Point	Loc ID	Degree	Distance	Latitude	Longitude	MSL Ceilin	MSL Floor
USER DEFINED ARE NUQ-APT			1		NUQ-APT		0	

Total Map Attachment 2

Maximum	Minimum	Radius	SUA Description		
0	37-24-58.10N	122-02-56.90W	1000	0	

40

0

3.0