

		ASN	2007-AHQ-8-COA
		Case Status	EXPIRED
		Date Created	02/13/2007
		Date Submitted	03/23/2007
Proponent Organization		Sponsor	NASA ARC
		Attn Of	Mark Sumich
		Address	Aviation Management Office
		Address2	Mail Stop 158-1
		City	Moffett Field
		State	CA
		Postal Code	94035
		Telephone	(650)604-6193
		Email	msumich@mail.arc.nasa.gov
Declaration		Declaration(a)	Yes
		Declaration(b)	Yes
Point of Contact		Representative	Matthew S. Whalley
		Address	MS 248-3
		Address2	NASA ARC
		City	Moffett Field
		State	CA
		Postal Code	94035
		Telephone	(650)604-3505
		Email	mwhalley@mail.arc.nasa.gov
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	<p>The Autonomous Rotorcraft Project (ARP) operates two Yamaha RMAX helicopters that have been retrofitted with the necessary avionics for autonomous flight. ARP has been operating the two RMAX helicopters and conducting autonomous flight research at Moffett Federal Airfield since 2001. Two prior COAs have been issued for this operation. The existing COA expires on 22 May 2007.</p> <p>Research topics for ARP include mission planning, autonomous landing, and obstacle field navigation. The results of this research have been published at numerous technical conferences and in technical journals.</p>
		Operational Summary	The RMAX helicopters are flown approximately once per week for a period of approximately three (3) hours. During these operational periods the helicopters spend approximately half the time airborne. The helicopters are flown one at a time -- no multi-UAV 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	
		Class-E	
		Class-G	
System Description		Aircraft Type	
		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
	Cruise Speed	Maximum	40
		Minimum	0
		Approach Speed	0
	Operating Attributes	Maximum MSL	1000
		Minimum MSL	1
		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	Yes
		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	No
	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	No
	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	No
		Quantity	
	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	Yes
		NAS Operational Capability Attachment	0
Visual Surveillance/ Detection Capability	Maximum Distance from UA	Vertical	1000 Feet
		Horizontal	0.2 Nautical Miles
		Airborne based (Chase Aircraft)	No
		Ground based	Yes
		Visual observation from one or more ground sites	Yes
		Forward or side looking cameras	No
		Attachment for All	0
Aircraft Performance Recording		Flight data recording	Yes
		Control station recording	Yes
		Voice Recording	Yes
Flight Aircrew Qualifications	Pilots	Private (Written)	Yes
		Private (Certified)	No
		Instrument	No
		Commercial	No
		Air Transport	No
		Unique Trained Pilot	Yes
		Unique Trained Pilot Description	Trained by Yamaha in the operation of the RMAX helicopter (see attached).
		DOD certified/trained	No
		Other Certified Training	Yes
		Trained on FAR Part 91 Requirement	Yes
		Medical Certification Class (FAA or DOD equivalent)	1,2,3
		Currency Status	Current third class medical certification. Note bug on page, cannot uncheck box 1 and 2 above.
		Duty Time Restrictions	None.
		Single UAS Control	Yes
		UAS Description	The External Pilot (EP) performs all pre-flight checks; flies the aircraft as required for each test sequence; and, has final responsibility for the safe operation of the aircraft. The EP is equipped with the flight control RC transmitter, the EP checklist, the Test Card, and a UHF trunking radio for communication with the ATC Tower and Ground Control Station. The EP is current, qualified, and approved to fly the RMAX by the FPO; is familiar with overall mission objectives and procedures; is familiar with prior practice of the prescribed flight maneuvers; familiar with the maneuver sequences prescribed for each flight; and familiar with crew coordination requirements.
		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	NA
		DOD certified/trained	No
		Other Certified Training	No
		Trained on FAR Part 91 Requirement	Yes
		DOD Certified Training Attachment	1
		Medical Certification Class (FAA or DOD equivalent)	2,3
		Currency Status	Pending. Observers shall obtain third class medical certification. Note bug on page, cannot uncheck box 2 above.
		Duty Time Restrictions	None.
		Single UAS Control	Yes

			<p>The Safety Observer (SO) watches for potential hazards such as other operating aircraft, approaching vehicles, or birds, and advises the EP of such hazards; ensures that the test vehicle stays within the assigned airspace at all times; monitors ATC tower radio frequency at all times; conducts radio communications with the ATC tower using standard pilot to ATC procedures; remains physically alongside the EP and maintains communication with the EP; ensures that a handheld fire extinguisher is readily available during all operations.</p> <p>SO equipment includes a UHF trunking radio for communications with tower and a flight operations mobile phone.</p>
		UAS Description	
		Total Numbers of UAS Controlled	1
Special Circumstances		Special Circumstances	

Flight Operations Area/Plan

Type	User Defin Point	Loc ID	Degree	Distance	Latitude	Longitude	MSL Ceilin
USER DEFINED AREA	NUQ		1				

Total Map Attachment

<u>MSL Floor</u>	<u>Maximum</u>	<u>Minimum</u>	<u>S Radius</u>	<u>SUA Description</u>	
			37-24-58.11N	122-02-56.91W	1000

0

40

0

2.0