



Standard Operating Procedure

SOP #	OPS-sUAV-AerialObservation
Revision #	
Implementation Date	8/8/2018
SOP Owner	Safety
Approved By	
Diagram or Manual Reference	SEAPRO_PolicyUAV

Purpose

The use of small unmanned aerial vehicles can aid in development and implementation of strategies and tactics during drill and recovery operations. The governance of authorization and use is outlined in the SEAPRO Policy Manual – SEAPRO_PolicyUAV.

Scope

Any qualified individual licensed to act as a Commercial Pilot in Command (PIC) as outlined in the SEAPRO policy will use this SOP when operating SEAPRO owned sUAV equipment.

Prerequisites

FAA Commercial Drone Pilot endorsement and completion of an Aerial Observation Training course.

Any licensing, exemption and waiver authorization as outlined in the SEAPRO_PolicyUAV. Additionally, prior to any flight operations a Flight Plan will be created, the Pre-flight Checklist will be completed, and a preflight crew safety and operations briefing will be conducted.

Responsibilities

The Pilot in Command (PIC) is solely responsible for the SOP executions.

Tools

sUAS Program Kit.

Step-by-Step Procedure

Perform a Site Safety Assessment. Note and correct any safety concerns.

Locate the SEAPRO sUAV Flight Base computer (FBC) in the sUAV Program Kit. Open the FBC case and log-in on to the computer. Log-in instructions are in the FBC case.

Complete a Flight Plan using the DJI Flight Planner app. The step by step instructions are in the Program Documents Kit.

Obtain a current weather briefing.

Enter the Flight Log information in the Flight Base application.

Unpack the sUAV and controller from the sUAS Program Kit. Establish the Home Base location from which the sUAV will operate.



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Complete all the tasks on the Pre-flight Checklist and log the results on the Pre-flight Checklist Entry Form in the Flight Base application. The checklist will walk you through elements required prior to any flight operation. Never commence flight activities without completing a Flight Plan and Pre-flight inspection, and logging the results.

Enter the flight data for the mission using the Flight Log Entry Form in the Flight Base Application.

Turn on the Flight Computer (iPad). Instructions on how to start the computer, authenticate and launch the DJI Go application are in the Flight Program Documents Kit.

Turn on VHF Airband Transceiver and tune to CTAF frequency for the area of operation. Monitor radio traffic during flight operations.

The sUAV Controller and sUAV should be turned on and communications synchronized as a result of your Pre-Flight Checklist completion.

From your home base location test the sUAV flight controls by ascending to an elevation of 10 ft. AGL and engaging all flight controls.

Upon acceptable control check fly your planned mission.

Monitor air traffic using IC-A14 VHF Air Band Transceiver.

Once your mission is completed log the mission results in the Flight Log, charge all sUAS equipment in the sUAS Program Kit and secure the equipment for next use.

Controls

Only current license holders and trained individuals may operate sUAS equipment.

Field Level Risk Assessment

UAV safety hazards include:

- High loss of altitude
- Loss of control
- Loss of transmission
- Collision with manned, unmanned aircraft, or buildings powerlines or equipment
- Partial failure or loss of navigation equipment
- Severe weather or climatic events
- Improper maintenance or failure to adequately perform inspections and pre-flight checks
- Pilot unfamiliarity with the equipment or flight location
- Rotor or equipment failure
- Take-off and landing incidents

Checklist

- PIC is licensed and properly trained
- PIC has performed a Pre-flight check of all systems



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- Flight Plan has been developed and entered into the flight computer
- Waivers and permissions have been secured (if needed)
- Mission flight log entry as been made
- A current weather briefing and TAF (if needed) have been obtained
- All flight equipment is fully charged and 100% functional
- The operations area Site Safety Assessment has been performed and any safety concerns noted and corrected, or mitigation strategies and engineering controls put in place prior to commencement of flight operations.
- Crew and observers have been briefed
- Post flight log entries are completed
- Equipment is fully charged and ready for next use prior to storage

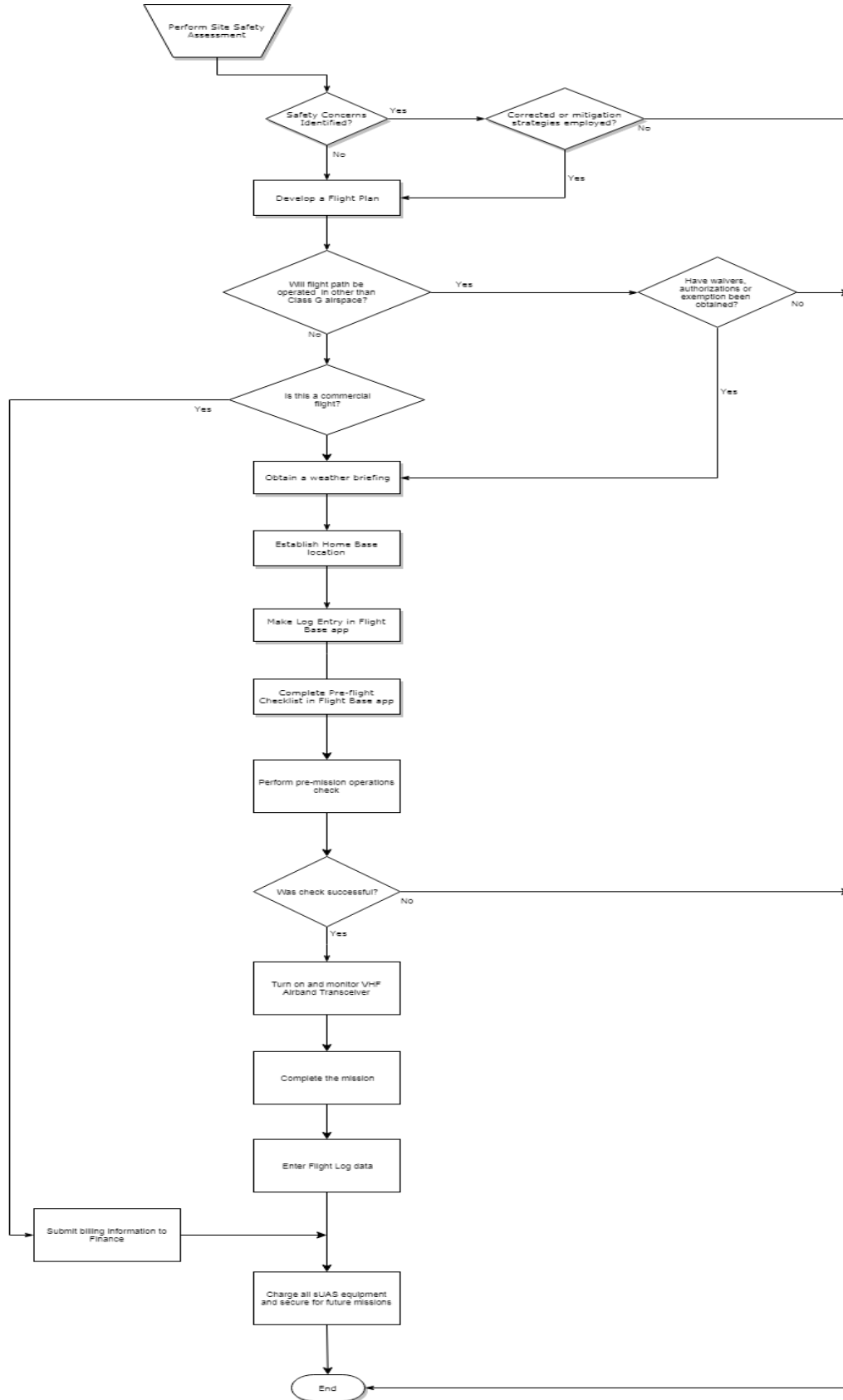
References to JSA Analysis

See 02.sUAV_JSA (attached)



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Process Flow Diagram



Job Hazard/Safety Analysis (JH/SA)

Work Category: Spill Operations

Work Location: Spill Site

Date: 2018-08-15

Task Description: sUAS Operations

JHA No.: 02

Sequence of Job Steps	Identified Hazards and Critical Behaviors	Recommended Procedures
Site Assessment	Slippery, uneven surfaces. Hyper or hypo thermic conditions. Water hazards. Possible dangerous wildlife encounter. Hydrocarbon and other chemical exposure.	Perform assessment in PPE appropriate for the work environment. Level D is acceptable in all but elevated chemically hazardous environments. Footwear for uneven, wet and slippery surfaces is required.
Pre-flight check	None identified.	None.
Flight Plan development	None identified.	None.
Transport, unpacking and set up of sUAS equipment	Lifting and carrying.	Use proper lifting techniques as outlined in the NIOSH WPG, 1981.
Flight operation – take off, landing and general flight	sUAV's employ high velocity rotors for aircraft movement. Aircraft may operate at eye level and overhead.	Operate only in controlled space with observers and workers clear of launch area. Never operate directly above works and if possible stay down wind of work area.
Remote controller manipulation	Repetitive motion injury	Take frequent mini-breaks. Stretch wrists, arms and fingers. Shake them lightly and let hang at sides for brief periods.
Flight and controller monitor observation	Eye strain	Shift sight focus from flight monitor screen to sUAV often. Change focus from near to far. Use a flight observer whenever possible to maintain visual contact with sUAV at all times.

sUAS Operational Safety Risk Map

ID	Safety Hazard Identification				Safety Risk Assessment			Safety Risk Mitigation			
	Safety Item or Hazard	Element	Root Cause	Worst Consequence	Type of Finding	Severity	Probability	Risk Level	Corrective Action	Preventive Action	Responsible Party
1	Loss of Power	Technical	Battery	Harm to people	Minor	Catastrophic	Remote	Tolerable	Replace Battery	Inspect power system	PIC
2	Under-shoot or over run take off or landing	People	Skill Level/GPS	Harm to people	Major	Major	Occasional	Unacceptable	Keep observers and workers clear of take-off area	Training, system calibration	PIC
3	Camera failure	Technical	Transmitter	No stream	Negligible	Minor	Remote	Acceptable		Training	PIC
4	Rotor Failure	Technical	Maintenance/Inspection	Harm to people	Major	Major	Occasional	Unacceptable	Training	Pre-flight inspections and proper set-up and maintenance	PIC
5	Loss of comms link	Technical/people	Controller failure or operating at distance more than RC range	Harm to people	Major	Major	Remote	Unacceptable	Training	Training, power systems properly charged	PIC
6	Catastrophic hardware failure	Technical	Power system or hardware failure	Harm to people	Major	Catastrophic	Remote	Unacceptable	Proper inspection and maintenance	Never operate above workers or public	PIC

Personal Protective Equipment Required for this Task:

Level D	Hard Hat, Gloves, Safety Glasses, Steel Toe/Shank Boots, Coveralls
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Safety Equipment Required to do this Job:

- Fire Extinguisher
- PFD
- Chemical Protective Clothing
- Cork Boots
- Confined Space Permit
- Hot Work Permit
- Hearing Protection