

Emergency Procedures Description

NASA DFRC Ikhana Local Area UAS COA Application Attachment

NASA Dryden Flight Research Center (DFRC) has procured from General Atomics – Aeronautical Systems Incorporated, an MQ-9 Reaper aircraft and a Ground Control Station (GCS). DFRC has assigned the number “NASA 870” to the aircraft and renamed it “Ikhana” (pronounced ee-kah-nah, a Native American word from the Choctaw Nation meaning intelligent, conscious, or aware).

The Ikhana UAS is a complex electromechanical aircraft that depends on an engine driven generator to power the avionics and flight controls. In many systems, the aircraft has 2 and 3 levels of redundancy. Despite the redundancy, there are a few failure modes and emergencies that would prevent the aircraft from completing the planned mission.

Specific Predator B (MQ-9) emergency procedures are covered in USAF TO 1Q-9 (M) A-1 and coordinated with the appropriate air traffic control facilities.

This attachment addresses two emergency situations and their constraints that would warrant landing the aircraft as soon as practical. (b) (3) (A), (b) (3) (B)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]


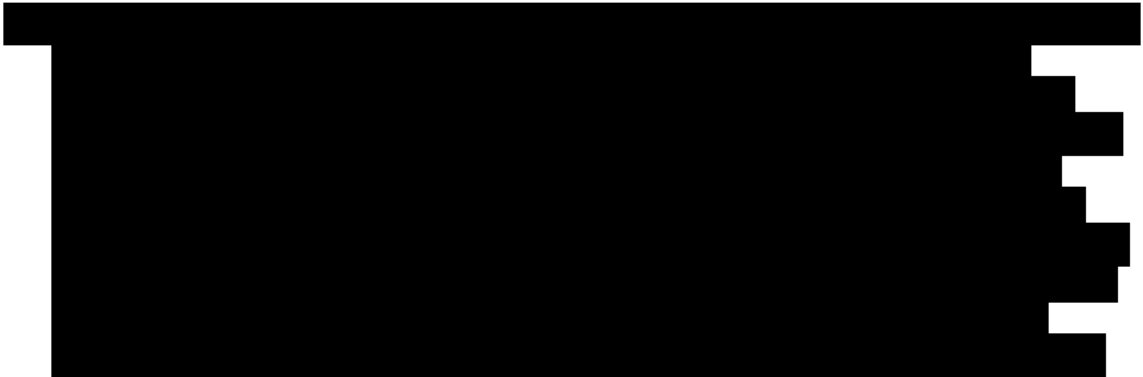



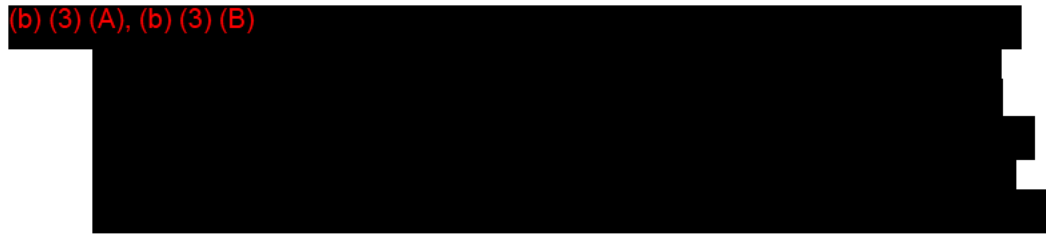
3. Pilot Actions During an Emergency –

- 3.1. The pilot will and flight crew will perform actions as specified in the MQ-9 Flight Manual (TO 1Q-9(M) A-1) and consistent with protecting public safety.
- 3.2. If the aircraft cannot reach a selected emergency landing site, the pilot will position the aircraft in a remote location where the subsequent loss of the aircraft causes minimum hazard to population and ground assets.
- 3.3. **Real-time Emergency Landing Site (ELS) Selection –**
 - 3.3.1. The pilot will select an emergency landing site based on the nature of the emergency, aircraft position, real-time weather and other factors.
 - 3.3.2. The pilot may select an appropriate emergency landing site outside the Local Area COA boundaries and within the R-2508/R2515 Complex depending on the nature of the emergency. The ELS may be in R-2508/R-2515 rather than within the Local Area COA boundaries. This specifically includes R-2515 and Edwards AFB, Ca.


3.3.3. Communication with ATC – The pilot will declare an emergency to ATC, and advise ATC of aircraft condition and pilot intentions. The pilot will maintain communication with ATC as conditions warrant.

3.4. **Flight Profile to Selected ELS** - The pilot will select a flight profile that is consistent with the emergency, with the safety of other aircraft in the NAS, and population on the ground.

(b) (3) (A), (b) (3) (B)



(b) (3) (A), (b) (3) (B)



6. **Emergency Landing Sites (ELS)** – NASA DFRC has a desire to attempt to land the aircraft in an emergency situation.
 - 6.1. In an emergency situation, when the risk to people in the air and on the ground is not increased, it is desired to attempt to land the aircraft at a suitable landing site.
 - 6.2. **Pre-mission Emergency Landing Site Selection** – Although the NASA DFRC and General Atomics rules for pre-mission selection of an ELS may change, the full set is currently the following:
 - 6.2.1. Verbal FAA HQ UAS restriction: No airfields with an active Commercial or General Aviation presence. Private airfields by definition have a General Aviation presence. Gray Butte Field (04CA) and El Mirage (99CL) airports are, for the purposes of aircraft maintenance missions, available emergency landing sites since the contractor providing the maintenance operates from them.
 - 6.2.2. NASA DFRC restriction: No military airfields unless the controlling authority has been briefed on the aircraft, mission and risks and that authority approves designation as an Emergency landing site for these missions.
 - 6.2.3. NASA DFRC restriction: The DFRC Range Safety Office or local Range Safety Office must analyze each airfield and determine acceptable runways, approach corridors, lost link plans and orbit points (as applicable) with respect to surrounding populations.
 - 6.3. **Emergency Landing Sites** – Due to the nature of the maintenance mission and the proximity of the Ikhana Local Area boundaries, Edwards AFB, Gray Butte

Field and El Mirage Airports will comprise the primary ELSs. However, new sites are analyzed continuously by the DFRC Range Safety Office (RSO) and DFRC Operations for desirability and appropriateness so that the pilot has a current list of “acceptable” alternatives in the event of an emergency. The lists will be updated (additions and deletions) as new sites are analyzed and new information becomes available on the sites.

(b) (3) (A), (b) (3) (B)

