

Rainmaker Technology Corporation

Petition for Exemption & Concept of Operations

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Responsible Party

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1 — Executive Summary

Rainmaker Technology Corporation requests an exemption from 14 CFR Part 107.36 (Carriage of Hazardous Materials) to allow the use of burn-in-place (BIP) and ejectable flares during unmanned precipitation enhancement operations. The relief sought is limited to the carriage and controlled deployment of these flares, which are classified as hazardous materials, for the purpose of dispersing ice nucleating particles (INP) to stimulate precipitation in drought-affected regions.

The reason for seeking this exemption is to enable Rainmaker to fulfill state agency contracts aimed at restoring and revitalizing critical water infrastructure by increasing precipitation in areas experiencing severe drought. The use of BIP and ejectable flares is a proven method in manned cloud seeding operations, with decades of safe operational history and extensive validation through test flights and studies.

Granting this exemption is in the public interest because it directly supports efforts to combat drought, safeguard water supplies, and enhance water management at both state and federal levels. These operations contribute to the resilience of communities and agricultural sectors dependent on reliable water resources.

Safety will not be adversely affected by this exemption. Rainmaker employs rigorous risk management protocols, including the use of the U.S.-manufactured Elijah sUA quadcopter, real-time monitoring, ground-based radar, redundant communications, and automated return-to-home (RTH) functions. Operations are continuously overseen by a Remote Pilot in Command (RPIC), Visual Observer (VO), and Person Manipulating the Controls (PMC), with strict adherence to geofencing and operational boundaries to ensure the highest level of safety for both air and ground environments. These measures provide a level of safety at least equal to that required by the current regulation.

2 — System Analysis

2.1 System State

The System State will be:

- Day and night
- Only over the rural areas designated in Waiver Area
- Operational Areas always over land secured by contract
- RPIC will not be intentionally flying over people, structures, or moving vehicles
- Take-off and landing areas will be free of any non-participating personnel and/or equipment
- All flights conducted in accordance with operational waiver 107W-2025-00728 and with the various altitude waivers tied to specific locations throughout the country

2.2 Operational Description

The general overview of the CONOPS is to preposition the unmanned aircraft system (UAS) crew and the ground control station 200 feet upwind of the land/launch point.

Upon vertical takeoff, the sUA will proceed to make a direct climb without any horizontal movement. The sUA will level off at the target altitude that is dictated by meteorological forecast and with live sensor updates. Depending on the atmospheric conditions at the target altitude and positioning within the NAS, the sUA will either hover or fly ½ sm strafing legs.

At the conclusion of the test window, the sUA will return to the position over the land/launch point (if horizontal movement was made) and commence a descent vertically down to the original land/launch spot.

2.3 Flare Details

When appropriate, Rainmaker will utilize the various sizes of the Zeus and/or Ikarus flares manufactured by Cloud Seeding Technologies. The flares are bolted onto the sUA by a carbon fiber fitting specifically made to secure the flare to the platform. The two bolted-on flares are also hardwired to the control system onboard the sUA giving the RPIC control over when the flares will be ignited for operational commencement.

Once the sUA is at the targeted altitude and the meteorological conditions are present, the RPIC will actuate the flares via the ground control system. An onboard camera system will verify the successful employment of the flare and will also verify it is completely done operating to ensure safe conditions prior to the descent of the sUA. The Zeus and Ikarus flares are rated as non-explosive and their reliability has been tested during manned-flight operations from different entities.

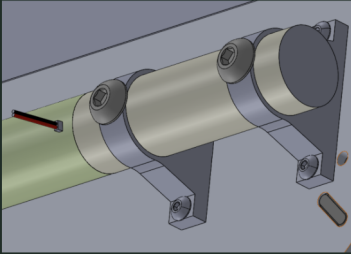
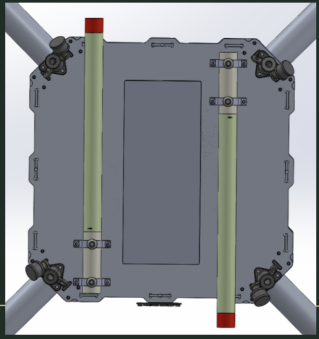
In the event the sUA makes an emergency landing and/or uncommanded landing prior to the full extinguishment of the flares, fire extinguishment equipment will be present and used by the ground crew for all flare operations. Due to the lack of horizontal travel the CONOPS utilizes, the ground crew will be able to expeditiously meet the sUA as soon as it lands in a controlled or uncontrolled manner.

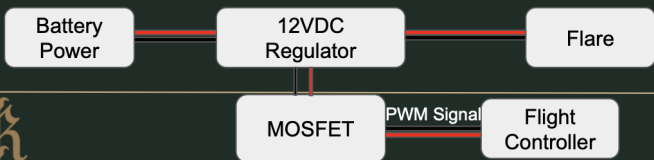
Mechanical Retention System:

- Primary retention is achieved via M8 × 30mm socket head cap screws that engage threaded inserts integrated into the clamping bracket assembly
- Each clamping bracket is secured to the base structure using two M4 × 10mm machine screws that thread directly into tapped holes in the drone's bottom mounting plate

Ignition Control System:

- Ignition sequencing is controlled by an integrated Power Distribution Board (PDB) that regulates battery voltage down to 12VDC through onboard voltage regulation circuitry
- The ignition circuit is activated via Pulse Width Modulation (PWM) signal processing, which gates current flow through solid-state switching to enable precise ignition timing control



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graph LR
    BP[Battery Power] --> R[12VDC Regulator]
    R --> F[Flare]
    R --> M[MOSFET]
    FC[Flight Controller] -- PWM Signal --> M
    
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2.4 Aircraft (Rainmaker Elijah Quadcopter Series)

sUAS type	Multi-rotor quadcopter
Battery	Lithium-ion battery
Maximum flight time	60 minutes
Maximum speed	35 mph
Maximum altitude	15,000 feet MSL
Dimensions (LxWxH, inches)	32" x 32" x 6.5"
Total aircraft weight (payload included)	50 lbs
Anti-collision lighting	2 strobe, flashing, FAA approved



1. **What kind of UAS will you use to fly the operations requested in this application?**
For example: multi-rotor, fixed wing, hybrid (both multi-rotor and fixed wing), single rotor, lighter than air, etc.
 - Rainmaker Elijah Quadcopter Series
2. **What is your UAS's power or energy source in flight?**
 - Lithium-ion battery powered
 - Four brushless heavy-lift motors
 - KDEDirect - KDE8218XF-120
 - 120Kv, 110 A continuous current
 - Eight carbon-fiber, dynamically balanced propeller blades
 - KDEDirect - KDE-CF305-DP
 - 30.5" x 9.7" carbon-fiber 3K materials
3. **What is your UAS's maximum flight time (in minutes), range (in feet), and speed (in miles per hour)?**
 - Maximum flight time: 60 minutes
 - Maximum range: 16,400 feet
 - Maximum speed: 35 mph
4. **How big is the aircraft (length/width/height in inches)?**
 - 32" x 32" x 6.5"
5. **How do you ensure the aircraft only flies where it is directed (i.e. ensure containment)? For example: geo-fencing, tether, etc.**
 - Containment is ensured through geofencing boundaries and autopilot flight paths.

- Flight management and autopilot is managed via PX4 flight control software via Rainmaker's ground control station named "Seraph".
6. **What kind of termination system, if any, does the UAS have? For example immediate flight termination switch.**
- The UAS is pre-programmed to execute a safe landing at a predetermined landing spot in the event of a triggered contingency procedure (ex. Lost link scenario or degraded subsystems).
 - The RPIC has the capability to command flight termination via the ground control system.
 - In the event of an emergency that precludes powered descent, the system has an immediate flight termination switch which kills power to the motors and allows the vehicle to drop without propulsion to the ground.
 - The sUA has an external GPS tracking module installed to assist in sUA recovery if needed.
7. **How much will the aircraft and its payload weigh when flying?**
- The aircraft and its payload will weigh no more than 50 pounds.
8. **If the aircraft carries any external or internal load (or object), how is the load secured?**
- All loads are secured by bolted polycarbonate and carbon fiber reinforcements.
9. **What, if any, external or internal load (or object) could be dropped from the aircraft when flying, and how will you assure the safety of people, or other people's property, if it is dropped or detached when flying?**
- Use of the Rainmaker Aerosol Dispersing System (ADS) and Zeus BIP flares do not drop any load and/or object during seeding operations.
 - Use of the Ikarus ejectable flare produces a spent tin casing after the material is burned
 - The remaining casing weighs approximately 2 ounces.

2.5 Anti-Collision Lighting

- The anti-collision lighting system, manufactured by Flytron (model STROBON XL Cree), maintains visibility up to 3 statute miles at night and 1 statute miles during day operations.
- The lighting system will flash at a rate of 1 flash per second.
- The Rainmaker Elijah will be equipped with 5 LED lights
 - One anti-collision light will be bolted to the top of sUA
 - Two dual-use anti-collision/navigation LED lights installed on either rear quadrants of the sUA
 - Two navigation LED lights installed on either forward quadrants of the sUA

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2.6 Airman/Operator

1. **What minimum level of experience will the Remote Pilot in Command (Remote PIC) have to fly under this waiver?**
 - All RPICs and VOs shall complete the Rainmaker Field Operators Training course with encompass all of the following:
 - Obtain an FAA Remote Pilot Certificate (Part 107).
 - Complete the Part 107 Small UAS Recurrent (ALC-677) online training course within 24 months of the previous training conducted.
 - sUA limitations
 - sUA programming
 - sUA operating procedures
 - Abnormal procedures
 - Air traffic avoidance procedures
 - Crew Resource Management
 - sUA flight training
 - Demonstration of sUA ground and flight skills
2. **How many personnel (including the Remote PIC) will you use for operations under this waiver (minimum needed)?**
 - 2 personnel will be used: 1 RPIC and 1 VO.
3. **What kind of training, if any, will personnel (e.g. visual observer(s)) have prior to flying under the waiver?**
 - a. **How will the personnel be trained?**
 - RPIC and VO:
 - In addition to being Remote Pilot certified, Rainmaker has developed a dedicated program for all RPICs and VOs to ensure they are properly qualified and prepared to work within Rainmaker's unique operational parameters. This RPIC training includes:
 - Obtain an FAA Remote Pilot Certificate (Part 107).
 - Complete the Part 107 Small UAS Recurrent (ALC-677) online training course within 24 months of the previous training conducted.
 - sUA limitations
 - sUA programming
 - sUA operating procedures
 - Abnormal procedures
 - Air traffic avoidance procedures
 - Crew Resource Management
 - sUA flight training

■ Demonstration of sUA ground and flight skills

- b. **How will the Responsible Person know the other personnel are competent and have operational knowledge to safely fly the UAS under the waiver conditions?**
 - Rainmaker maintains a log of completed training for all RPICs to ensure all personnel are qualified and permitted to operate.
 - The log will keep track of pilot currency and recurrency training requirements.
- c. **If personnel will be tested, what kind of testing will be performed, and how will evaluations be conducted and documented?**
 - Written testing as well as field testing will be conducted to ensure RPICs and VOs have a thorough and practical understanding of necessary tasks.
- d. **How will personnel maintain the knowledge/skill to fly under this waiver? Will recurrent training or testing be required?**
 - Recurrent training will be conducted every 24 months with testing to ensure competency.

2.7 Airspace & Environment

1. **Where do you plan to operate? Consider providing latitude/longitude and a detailed map of your planned flight area.**
 - The Operations Areas will not exceed 1 sm in horizontal displacement from takeoff location.
 - Flights will consist of three phases: vertical takeoff, hovering at altitude, and vertical descent.
2. **Do you want to fly in controlled airspace (Class B, C, D, surface E)? If yes, please see 14 CFR §107.41 and our guidance about Flying Near Airports**
 - No, all operations will be in Class G airspace unless separate authorization is obtained.
3. **Are there any other kinds of airspace within 4 miles of any planned flight area?**
 - Flights will never occur within 4 NM of Class B, C, D, or surface E.
4. **What kind of area(s) will you fly over? For example: rural, sparsely populated, congested, populated, a neighborhood, within city limits, large outdoor gathering of people, a restricted access site, etc.**

- Flights will always occur over rural areas and on properties that are owned by private landowners, with whom Rainmaker has developed close working relationships.
- These properties are located far away from regular vehicular traffic and non-participating persons.
- Within the properties, Rainmaker's 1 sm operational radius will prevent operations from occurring over public access roads or structures.