This is a representative sample of an approved waiver application for 14 CFR § 107.39

Description of proposed operation:

John Doe Drones plans to operate the sUAS below 400 feet and only in G airspace. The maximum altitude of the sUA is restricted by a tether, and the sUA will not exceed 25 feet agl. The proposed sUAS operations will occur over persons who are not direct participants in the sUAS operations, and population densities and numbers of persons which would be considered large outdoor assemblies of persons.

The sUA is a Lighter than Air design, with a maximum non-inflated weight of 10 pounds. The 10 pounds includes the envelope, power system, control system, and camera. In flight, the maximum tare weight is .1-2 pounds. This will ensure the sUA always operates with negative buoyancy, but remains controllable without using excessive control inputs or power consumption. In the event of a fly-away, the envelope does have quick release valve that will deflate the envelope. The valve is sized for a controlled gas release, and combined with the maximum operational altitude, keeps the kinetic energy low enough to not cause injury to humans, if it were to impact a person.

The sUA has been demonstrated to not cause a serious injury or worse, if it impacts a person for any reason. Detailed risk assessment information on testing and demonstration is located Appendix 1, titled “Risk Management” in the XYZ Operators Manual (OM). Excerpts from the XYZ Operators Manual:

1. Before flight, the unmanned moored balloon will be filled with helium and checked for buoyancy. The maximum tare weight must be no more than .1kg before takeoff. (OM section 2.1 operational limitations, section 4 operational procedures)
2. In the event of a single power system failure, the redundant ducted fans used for propulsion will keep the aircraft aloft. If all motors fail simultaneously, the aircraft will slowly descend, at a rate not exceeding 1 m/s (OM section 3.5 emergencies. Testing results and methodology to support the descent rate is located in OM appendix 4)
3. The nearly neutrally buoyant balloon, with a tare weight of no greater than .2 pounds, will transfer less than 1 joule of energy to a person. The 1 joule of energy transfer corresponds with a negligible injury risk to humans (OM appendix 5 for detailed assessment of the types of injuries likely to result with a transfer of 1 joule of energy to a human)
4. The sUA construction consists of two layers of rip stop nylon with a rubber like on the interior that allows the envelope to hold helium gas. Details on the material, material limits, construction techniques, failure modes, expected rate of gas loss, and validation testing is located in OM appendix 2.
5. The sUA remains flexible, and is not rigid when inflated to operational pressure. The flexibility assists in the absorption and distribution of impact energy through plastic deformation (OM appendix 5).

6. The sUA has an additional level of safety provided by the use of a small, high strength tether. This tether shall not exceed 30 feet in length, and will be used by the remote PIC to physically restrain the aircraft in the event of a flight control system malfunction, propulsion system failure, and to prevent a sUA fly-away in the event of high winds (detailed description of tether, tether strength, and maximum length in OM section 2.2 operational limitations, and appendix 7). The tether is longer than the maximum operational altitude to allow the pilot additional horizontal flight of the sUA.
7. A complete risk assessment of the proposed operation is located in OM appendix 1. Documentation, validation, and test data for the mitigations is referenced in the footnotes, and all the footnote information has been included in the OM and appendices by OM section number or appendix and page number.
8. There are no rotating parts or sharp edges which could injure a non-participating person. Rotating parts are enclosed in a manner that would not cause injury to a person in any of the above listed failure modes. The thrust vectoring system is contained within a protected housing. The protection grates are sized to not allow a human finger to reach the rotating interior parts (OM appendix 9 for design standard and validation materials to support meeting the design standard).
9. Prior to operations, in addition to being a part 107 certificated airman, John Doe Drones requires completion of the XYZ drone manufacturer training program. The training program includes both initial operator and continuing operator training curriculum. Both programs are taught by the manufacturer, and details, including curriculum, curriculum segments, minimum requirements, and completion standards are located in the John Doe Drones Operator Training Manual (TM). The training program includes ground, hands on training with the sUA, inflight training, and a flight skill test.
10. For all operations over human beings, there will be a second crew member required (OM section 2.6). This crew member must also undergo training (TM section 3).

Other examples of risk mitigations that have been used as risk mitigations for a successful waiver application to § 107.39 include:

- sUA size and weight do not pose an injury risk when impacting a human being
- sUA design features reduce the energy transferred to a human being in an impact, and the resulting energy transfer does not pose the risk of a serious injury to a human being
- sUA uses an energy dissipating device to lower the kinetic energy transferred to a human during an impact with a human being, the resulting energy transfer does not pose a risk of a serious injury
- sUAS incorporates a parachute system meeting ASTM F3322-18
- sUA has design reliability equaling the failure rates set forth in 14 CFR Part 23
- Continuing sUA reliability program
- Training
- Operational manual system
- Safety Management System

- Non-ISM C2
- Strategic mitigations to avoid most overflight of human beings, to achieve an acceptable level of safety
- Flight termination system
- Hands free duplex communication devices
- sUAS design has redundant systems and architecture
- sUAS software design assurances and version control
- geo-fence