# SureFly Research Project 2/12/2019

a. **A description of the nature of the research project being conducted.**

Workhorse is developing a two-passenger hybrid electric multi-rotor rotorcraft called SureFly. The objective is to develop an easy to operate drone-like helicopter that is safer than traditional helicopters and takes advantage of hybrid electric propulsion for ease of maintenance. The advanced flight control system of the SureFly incorporates positional control and protection, optionally piloted, and autonomous flight capabilities. The aircraft design is a composite fuselage and four composite arms with eight independent electric motors that are powered by a combustion engine and generator package.

Power is provided by an aviation-grade engine and generator package that generate the electricity needed for continuous flight. A battery pack is used to provide peak power when the demand is present, and acts as an electrical buffer. This battery pack will be used for emergency descent if the engine or generator becomes inoperable. The multi-rotor design is also a redundant feature which allows the pilot or operator to safely land in the event of an electric motor failure. In the event of a failure which does not allow for this safe recovery, a ballistic parachute will deploy and return the craft safely to the ground.

The SureFly is designed to carry 400 pounds of passengers/cargo for one hour, with 20 minutes of reserve fuel per FAA regulation. Flight time can be increased to 2.5 hours if passengers/cargo are reduced to 200 pounds; for instance, in the case of a single pilot with no passenger.

For us to continue to develop our aircraft we need a dedicated licensed frequency so that we may fly our aircraft remotely, without a pilot on board. This will allow us to safely expand our flight envelope without endanger human life.

b. **A showing that the communications facilities requested are necessary for the research project involved.**

The FAA has required us to acquire a licensed dedicated frequency to pilot the aircraft remotely. This dedicated frequency will help prevent frequency cross over and ensure a reliable connection to the aircraft. This link needs to be reliable and resilient to hacking because it will be used to send pilot commands from a ground control station. For us to continue to develop our aircraft we need a dedicated licensed frequency so that we may fly our aircraft remotely, without a pilot on board. This will allow us to safely expand our flight envelope without endanger human life.

c. **A showing that existing communications facilities are inadequete.**

We are currently using an unlicensed frequency to transmit the telemetry data from the aircraft to our ground control station but the FAA is concerned that someone could tune in to our frequency and take control of our aircraft. There is currently no risk associated with someone tuning in to our frequency because the aircraft doesn't receive messages to operate. The aircraft gets the control input from the pilot on board.

We now want to fly our aircraft remotely to remove the risk of endangering our pilot during the control development process. To fly remotely the aircraft must receive commands from the ground control station. This frequency must be licensed to prevent anyone from sending false commands to the aircraft.

The FAA has required us to get a licensed frequency before we can get approval to fly our aircraft remotely.