**Hazard Identification and Mitigation**

In the upcoming competition, a couple of hazards may be present. In any case of emergency, safety precautions will need to be taken into consideration. The potential hazards are:

* 1. Fire Potential: When using electricity, fires are always a possibility. The drone is powered by a lithium-ion battery and if damaged can cause issues. In uncommon cases, a damaged lithium-ion battery can catch fire or become a flammable object. If this happens, the fire can be put out with either water, or an CO2 fire extinguisher [1].
  2. Sharp/Pinching Objects: The rotors on the drone can become dangerous with close proximity. At high rotations of the rotors, hazards of being cut or tangled in the propeller become a higher risk. By keeping distance as well as tying back hair, the likelihood of this hazard occurring is reduced [2].
  3. Temperature: The drone may be tested over a smokestack which may have high temperatures. In most cases, the drone would probably cool off before we handle it again, but precautions are necessary. Gloves can be used when handling the drone after data retrieval. This will help prevent anyone from getting burned.

* 1. Lithium Battery: The drone operates on a Lithium Ion battery. Lithium-ion batteries can become a high-risk hazard when damaged. Fires can start from a damaged battery. They can also release fumes that can irritate eyes, lungs, and skin [1]. To prevent and prepare for this hazard, the Lithium-ion batteries can be checked for damage, punctures, or swelling, prior to use. After this, NMSU Environmental Health Safety can be notified for further instruction.
  2. Potential High Elevation Falls: Since the drone will be flying fairly high in the air, the hazard of it falling need to be considered. The data collection by the sensors will likely be conducted at a higher altitude, therefore any kind of drone malfunction can pose dangers. It may fall on someone on the ground which can be extremely serious. To prevent this, we want to keep the testing zone clear. In this case, the drone can fall and not have the chance of collision with a bystander.
  3. Harmful VOC and PM: Since the whole goal of this competition is to build a sensor to read VOCs and PMs, contact with these emissions is inevitable. The exact kinds of emissions that we test are still unknown, but preparation is still an option. Some of these emissions can be hazardous therefore using respiratory, eye, and hand protection can prevent falling ill due to these harmful emissions [3].
  4. There is inherent danger in drone operation. It can interfere with FAA operations and can present a risk to personnel and property. Drone operations will be handled by licensed drone operators at facilities that are designated to be safe and legal places to operate a drone.

**References**

[1] M. (2017, March). Lithium Ion Battery Safety Guidance PDF. Retrieved February 19, 2019, from https://ehs.mit.edu/site/sites/default/files/documents/Lithium Battery Safety Guidance.pdf

[2] Canadian Centre for Occupational Health. (2018, February 14). (none). Retrieved February 19, 2019, from https://www.ccohs.ca/oshanswers/safety\_haz/sharp\_blades.html

[3] UNITED STATES DEPARTMENT OF LABOR. (n.d.). Retrieved February 19, 2019, from https://www.osha.gov/SLTC/hazardoustoxicsubstances/control.html