# Safety Always: Standard Operating Procedures for Drone Operations and Secure Data Collection

Safety and security are foundational to effective commercial drone operations. Accordingly, SKYDATA has designed its drone flight standard operating procedures--built on flight hours experience as well as Crew Resources Management--with the primary objective being to decrease safety risks and reduce risk of damage to our client's assets.

As a result of our work, we are currently on process to obtain industry leading grades, on behalf of many of our clients, to enhance their efficiency and collaborative experience with us. Aware of the importance of safety and risk mitigation our Experience Modification Rate (EMR), a number used by insurance companies to gauge risk, is better than the industry average.



ISNet A-rating

NCCI EMR Rating

In addition, SKYDATA is on process to obtains its certifications by the International Standards Organization (ISO) in the areas of Quality Management (ISO 9001), Safety (ISO 45001), Environmental Management (ISO 14001), and Information Security (ISO 27001).

*In this whitepaper, we review the risks associated with drone-based data collection and the processes, policies, and procedures we apply to mitigate those risks.*

## MAKING DATA COLLECTION AND INSPECTIONS SAFER

In late October 2018, a helicopter carrying four crew members who were tasked with maintaining power lines came into contact with the lines and caught fire in northern New York state. Two members of the crew were killed; two were treated at the hospital and released. Portions of the helicopter hung from the power lines before falling into a cornfield below. Unfortunately, this was not an isolated incident. Reports of similar wire strike and other types of accidents regularly appears in the news.

While helicopters have a relatively safe operating history, the unfortunate reality is that crashes do occur. **The risk from using helicopters for inspections and data collection is especially high**. An inspection flight takes a helicopter close to power lines, or obstacles such as terrain, trees, building, often in constrained right of ways. Combine this with the fact that a helicopter weighs tens of thousands of pounds and carries a significant amount of fuel and a crew, and it is obvious that a crash can result in catastrophic losses. The impact can affect the crew onboard and anyone in the immediate area, as well as the aircraft itself, an enterprise's critical assets, customers, and structures below.

The average UA or Drone, however, weighs less than 10 pounds. If a crash occurs, the likelihood of serious injuries or death, in comparison to a helicopter crash, is considerably lower. And the rare loss of a compact 10-pound Drone, while regrettable, does not have the same human or financial impact, nor the potential to create a large debris field.

Another common method of data collection and inspection for power companies is for workers to climb towers that are hundreds of feet high. The risk for falls and serious injury or death is significant, but there is also a risk of electric arc flash exposure, which can result in both shock and falls. So, if an organization can keep its crew on the ground, the risk of injury or death decreases significantly. Drones provide the capability of capturing data without requiring dangerous climbs or, as with other enterprises, traveling through difficult terrain.

As Stefano Sferrazza, Co-Founder and Director of Flight Operations for SKYDATA, explains, "When other safety mitigating measures are used (such as not flying over people), the risk for injury is reduced to an almost negligible level. Secondly, if an accident were to occur, the severity is a small fraction of traditional collection methods."

Of course, the priority of any commercial drone operation is to prevent incidents in the first place. To that end, safety-conscious flight operators deploy drones featuring optical collision detection and avoidance, redundant navigation systems, and other automated flight safety features. Piloted by an operator who has gone through a robust training program and follows codified standard operating procedures, drones enable inspections that boast a significantly lower risk profile than those done with helicopters.

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The fact that DRONEs give enterprises the ability to conduct safer inspections outdoor as well as indoor and in complicated sometimes hostile, life-threatening environments is likely why the New York Power Authority, like several utilities, is working with the Electrical Power Research Institute to investigate the benefits of using drones as a means of data collection.
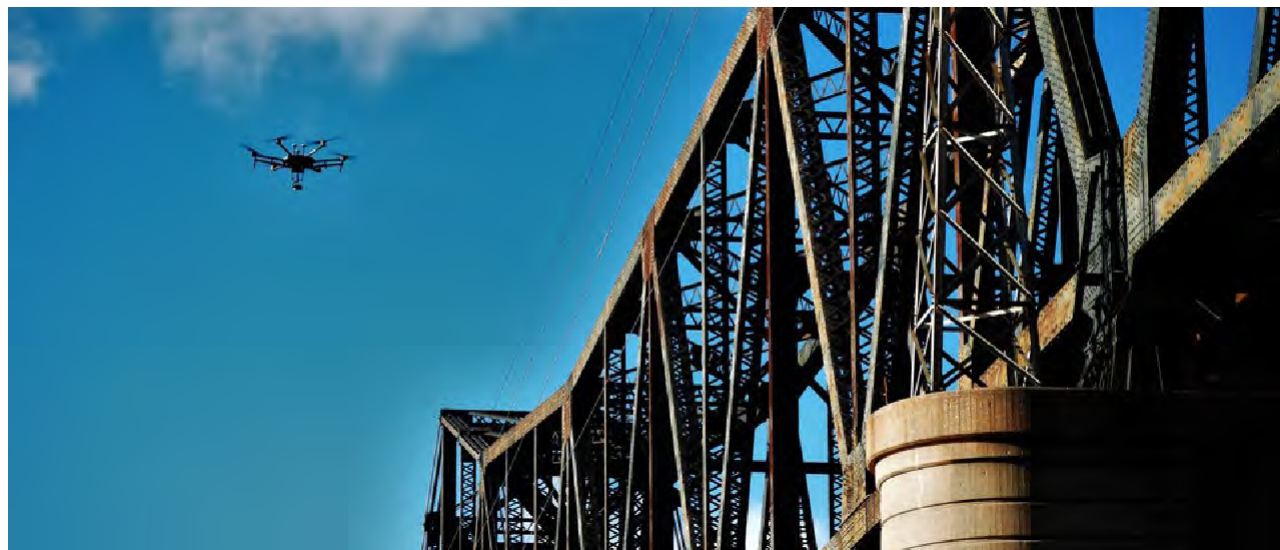


## ENSURING SAFE DRONE OPERATIONS

Although drones provide organizations a considerably safer means of data collection, Drone operations do still present some safety challenges, and it takes a serious commitment to operating safely in order to help ensure that those challenges are either eliminated or significantly minimized. This can only be achieved through a rigorous Safety Management System that includes risk mitigations processes. When an enterprise is considering using drones for inspections and data collection, how a drone operator approaches safety should be a discriminating factor in that selection process.

Effective safety and security programs for drone operations are comprised of:

| Selecting Qualified Operators | Training | Mission Planning and Procedures | Continuous Improvement |
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***And through all operations, a safe drone service provider is one that holds safety as its highest priority.***

## SELECTING QUALIFIED REMOTE PILOTS

The drone industry is still in its relative infancy: While the U.S. Federal Aviation Administration's (FAA) Part 107 Remote Pilot Certificate "demonstrates that [the Remote Pilot] understands the regulations, operating requirements, and procedures for safely flying drones" in the national aerospace system, it does not necessarily qualify the Remote pilot for a given commercial mission.



Safely flying powerline inspections, construction job sites, and other common areas of interest requires that operators obtain competencies above and beyond the scope of the FAA's Part 107 certification. **So, decision makers and managers must further assess the 150,000+ Part 107 licensed Remote pilot to determine if they're fit for flight in their business.**

In our experience, SKYDATA has found that operators should ideally:

> Have a substantive number of hours flying drones, helicopters, or other aircraft--either commercially or militarily

> Have experience working in the industry of the given application (i.e., utility linemen, construction workers)

> Have experience working with surveyors or geospatial scientists

> Have worked within safety management and data security programs

> Are process- and detail-oriented; methodical

> Exhibit a healthy respect for the responsibility and risks associated with flying aircraft

> Show that they understand basic aerospace technology and mechanics

**Though most candidates will not fulfill all of the above criteria, consider how their background applies.** For example, many of our top operators come from the aviation and airline industry but had never flown commercially prior to joining our operation. **Many of our clients cross-train field workers in drone piloting.** No matter who we select to join our flight operations group, we require that they demonstrate a willingness to learn and adapt to rapid change.

The vetting process begins with a series of interviews, including one with our Director of Flight Operations, an active airline pilot who personally interviews every potential remote pilot. Before beginning work, our remote pilot must pass a background check and complete a rigorous training program.

## TRAINING OUR PILOTS

We don't assume any knowledge from our incoming pilots, even though they come with experience and are highly recommended.

As Stefano Sferrazza, Director of flight Operations explains, "**We put them through training as if they had never flown before, not because we don't trust them, but because we want them to fly with our methodology.** We have specialized techniques, and we want to make sure that we are operating with safety as our highest priority."

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**From the day a new flight operator walks in our door, we instill in them our culture of "Safety Always."** The first step in the onboarding process is meeting with our Safety Coordinator, who ensures that the new team member has the required safety equipment and is current on certifications. In addition, she schedules them for a bevy of required training and compliance courses, including:

### 1. *Flight and Sensor Hardware*

A safe and effective flight is founded on **selecting the appropriate drone hardware.** We train our drone operators on how to select hardware that's purpose-built for a range of flight environments. We also train them on how to handle sensors and storage media to help ensure secure data capture and transfer.
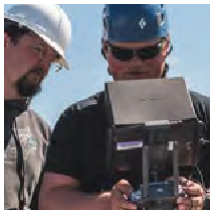
### 2. *Flight Software and Planning*

**To execute safe missions, our pilots use dedicated professional software.** The software's intelligent flight planning enables operators to deploy manual, semi- autonomous, and fully autonomous missions that comply with regulations and safety management systems. Prior to a mission, the drone operator defines a flight plan by combining asset and area of interest specifications with 3D geospatial data, such as the surrounding terrain and no-fly zones. To identify potential issues, they emulate the flight in the software, setting additional boundaries as necessary. For the most complicated assignments, a simulation can be set-up and flown ahead of the mission. They also learn how to **investigate regulatory issues that pertain to both the launch area and the associated airspace** (not to mention, the weather).

### 3. Situational Awareness

In order to operate safely, Drone pilots must have the appropriate training and situational awareness. As James Correl, a SKYDATA pilot, explains, "There is a learning curve in piloting drones, and it can be a steep one. **Technology, weather, and other variables make drone operations challenging.**" Flights over and around more urban areas require a completely different approach to those over cornfields or in areas uninhabited by people. The wildlife and terrain of each area also must be taken into consideration when developing flight mission plans, as does the weather for each day.

### 4. Quality Assurance

Quality reporting outcomes start with quality data. That's why we train flight operators on how to investigate the quality of the data they capture, while in the field. Using SKYDATA's offline field analysis tool, they learn how to **identify anomalies, omissions, and other issues prior to delivery.**
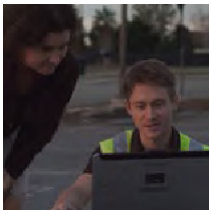
### 5. Data Secure Chain of Custody

**We train our operators to protect mission data** by following secure transportation, transmission, and destruction protocols. This includes the modification of flight hardware and handling of physical media disks to maintain our "air gap" protocol designed to provide extra layer of security between the data and the internet, where required.
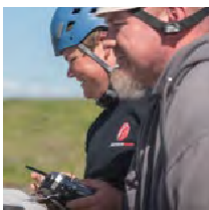
### 6. Continuous Improvement

Finally, **we train our operators how to engage in a continuous improvement plan,** not just for their own flight operations skills, but for reporting lessons learned to the broader flight organization so that everyone can apply them to future operations.

By instituting a common onboarding curriculum, SKYDATA flight organization adheres to a universal set of standards. As a result, our pilots follow a common protocol in the field: **they take off the same way, fly the same way, and manage to the exact same risk mitigation standards.** And they do so regardless of their prior aviation experience. Our attention to this kind of detail helps to eliminate potential for miscommunication or misunderstanding. It also means that our remote pilots and sensor operators can immediately work together from the same set of procedures, even if they are teamed with one another for the first time, not unlike how a flight crew functions on board a commercial passenger jet. No surprise there as the Co-founder is an active airline pilot.

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*"SKYDATA Drone Operations has all of the hallmarks of a professional aviation organization, in that we have routine and rigorous training, standards that are consistently applied, and a professional aviation mindset. That yields consistent, repeatable, safe flight operations."*

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—Capt. Stefano SFERRAZZA

**We expect our pilots to display consistently good decision making,** and they must master certain maneuvers within a specific timeframe, or we rescind the offer of a position. Once they pass the first level of training, they begin their work as sensor operators, rather than drone pilots, which gives them the opportunity to work alongside seasoned SKYDATA remote pilots and to further their understanding of the operation. After they have demonstrated a full understanding and aptitude as sensor operators, they then undergo further training before they are graduated to piloting our drones, first under the watchful eyes of veteran pilots once again, and ultimately on their own.

# CREATING CUSTOMIZED MISSION PLANS FOR EACH PROJECT



## 1. Pre-mission

Every project begins with developing a detailed mission plan. The person closest to the drone is most at risk, so the safety of the operator is paramount. Accordingly, we believe that **developing mission plans that take the unique characteristics of each job into consideration is critical to maintaining safe operations.** Some of the non-flight factors we plan for is the travel required to get to the data collection site, any walking over difficult terrain required, and both hot and cold temperatures. Pre-operation site visits and/or discussions with individuals with first-hand experience with the site are also done where appropriate. This is in addition to carefully studying each project and making sure that we adhere to all regulatory and client concerns.



## 2. Safety Briefing

Careful review informs every step of a day out in the field. **Each morning on the job site begins with a safety brief,** during which the team discusses the issues that are present for that specific day, in that specific location. This might include weather, wildlife, terrain, and other factors that could present challenges during flight. The review gives every crew member the opportunity to identify any hazards that they observe and call them to the attention of the team. Any hazards observed are also reported to the Safety Risk Management Program. The safety brief includes a review of the plans in place to respond to any issues that may arise so that everyone can quickly respond to a situation and minimize the risk of injury or of damage to assets. As Stefano Sferrazza, SKYDATA Director of Flight Operations, explains, **"Every potential incident has its own specific emergency response plan."**

### 3. Execution

Although our crews are exceptionally well-trained and well-prepared for flight operations, we don't rely exclusively on their preparation to see them through a contingency. **We have clear, codified procedures** that we distribute to our team members regarding how we fly, how we handle contingencies and emergencies, and how we delineate responsibilities and roles within a field crew. If, in the midst of responding to a challenge, a pilot is unsure of the next step, they can quickly refer to their procedure cards as a backup guide.

On a given day, the pilot and sensor operator might conduct several flights, and the review process continues as the **crew members are trained to conduct a mini debrief after each flight.** This allows the team to take an intentional, deliberate pause between each flight to discuss any new issues that may have arisen and develop a plan to respond before proceeding to the next flight. It also gives them the opportunity to check in with each other on assessing the success of the flight.

### 4. Debrief

Finally, the team conducts a more extensive end of day debrief, once again discussing and noting any concerns or issues. **This measured, purposeful process of review helps ensure that we continue to operate safely** and to expand our knowledge base. This is also why we also conduct bi-weekly safety meetings, as they allow us to share information with one another and keep everyone in the loop.

## HARNESSING OUR COLLECTIVE EXPERIENCE FOR CONTINUOUS IMPROVEMENT

SKYDATA capitalizes on its founder **25 years and countless hours of flight experience** to continuously improving safety procedures and processes. As part of their training, our team members learn that we encourage and expect them to report all challenges, near misses, and incidents during each day of flight operations to our Safety Management System. This provides us with a reliable flow of information and ensures that we can regularly review and analyze issues encountered by our teams and determine if we need to make additions or adjustments to our procedures and to disseminate these procedures to all of our team members. SKYDATA practice the "Just culture" in which crew aren't blamed unless a gross or intentional misconduct is the cause of the incident.

As our knowledge base continually expands, it allows us to identify new areas of potential risk and develop measures and procedures to mitigate those risks. As Duen Sferrazza, Co-founder and General Manager, explains, "We use a constant feedback loop and 'lessons learned' program to facilitate process improvement throughout the entire client engagement."

## ENSURING THE DATA COLLECTED IS SAFE AND SECURE

As with our safety procedures, we have developed a clearly codified approach to data security. **SKYDATA pilots undergo rigorous training in data quality assurance, security, and chain of custody protocols.** In addition to their onboarding, pilots often receive specialized training for a project, as each clients have a unique set of security considerations.
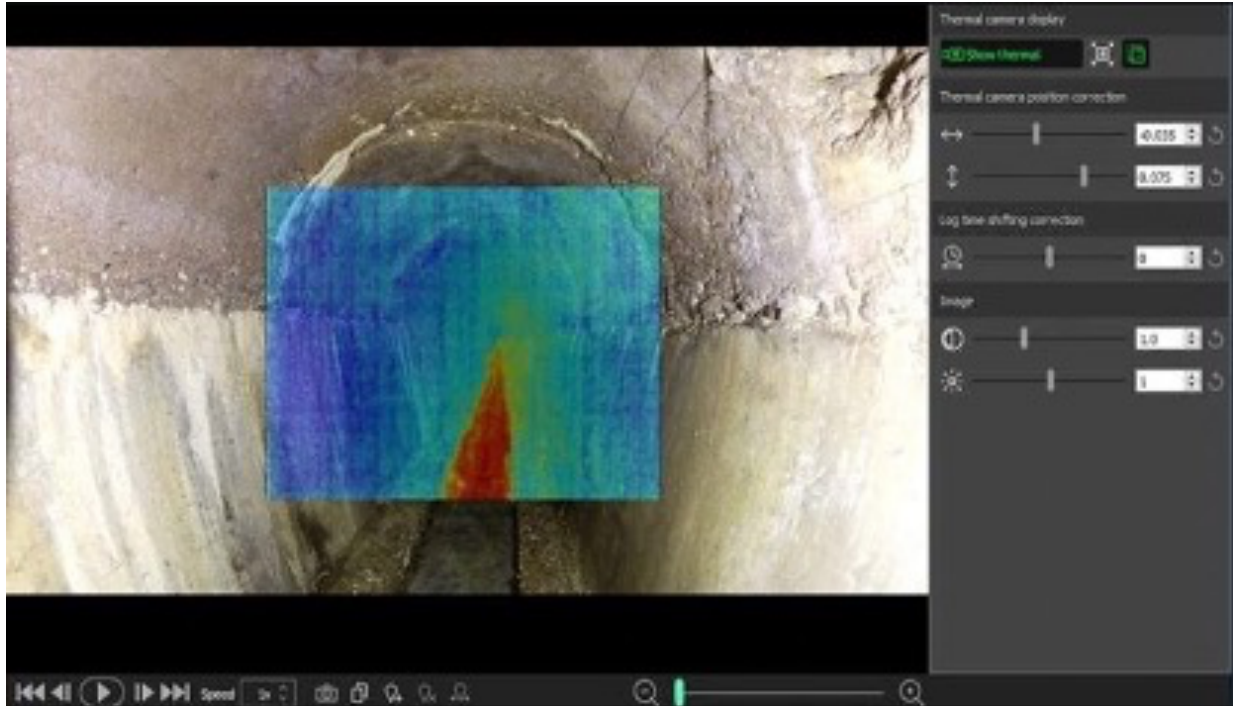


As a standard practice, we take steps to isolate each drone from the internet, which means that **a client's data from an inspection is protected from the moment the information is collected.** For some clients, we upload data from the aircraft direct to Amazon Web Services, a cloud-based solution that is vetted by the United States' own Central Intelligence Agency for maintaining its own sensitive data.
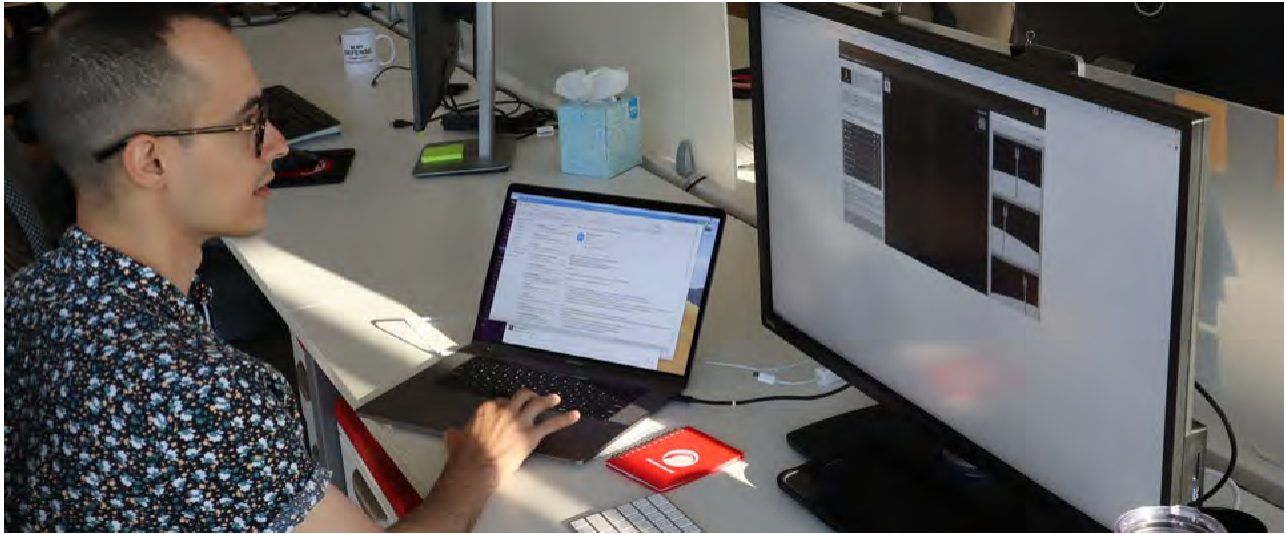
For more security-intensive clientele, **we transfer the data to an encrypted hard drive.** That data then never gets unlocked unless it is being analyzed or it has been placed on the clients' secured network. "We dedicate significant time and energy to safely handling the data we collect for our clients' critical infrastructure. We work directly with each client to develop a custom, tailored solution that meets or exceeds all of their needs and expectations," explains Duen Sferrazza.

SKYDATA has passed security audits conducted by a major auditing consultancy, as well as top 50 American utilities and oil and gas supermajors, organizations that are some of the largest and most security-conscious in the world. **We are on the process of being certified in ISO 27001 for Information Security Management Systems (ISMS).**

*"We dedicate significant time and energy to safely handling the data we collect for our clients' critical infrastructure."*

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## WHY SKYDATA?

SKYDATA's leadership developed their standard operating procedures, pilot training program, and safety culture from their experience as airlines and corporate pilots. As Stefano Sferrazza affirms, "**Our safety mindset is deeply rooted in Airline Aviation safety principles.** We are a professional aviation organization that takes the same approach to flying drones as others do to flying commercial fixed-wing aircraft and helicopters."

Throughout this discussion, we've illustrated SKYDATA's determination to help ensure safe operations and secure data management.

**In short:**

Our UAV pilots, who we view as professional pilots, undergo rigorous training in all aspects of flight operations and data security.

Remote Pilots Contractor who flies for SKYDATA go through the same training as our full-time SKYDATA pilots prior to missions for safety-intensive organizations, giving our clients the same level of assurance in safety, quality, and security, while also making a pilot available within 24 hours in New Hampshire.

Our Safety Risk Management program helps ensure that we are always collecting and reporting critical information that we review in order to **develop and refine best practices** and disseminate those to our team members.

We take measures to help ensure that our clients' data is protected from the moment it is captured, following precise chain of custody protocols.

We are on process to be **certified in ISO 9001, ISO 45001, ISO 14001, and ISO 27001**.

Learn more about SKYDATA. https://www.skydatausa.com/

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To speak with one of our consultants about your drone solution, Call us today!

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