# Table of Contents

1. **Scope** ..................................................................................................................................................... 3  
2. **Background Information** ....................................................................................................................... 3  
3. **Procedure for Unmanned Aircraft Flight Operations Under the FAA small UAS Rule** ......................... 4  
   3.1 **Project Coordination and Support** ................................................................................................ 4  
   3.2 **Aircraft Insurance** .......................................................................................................................... 4  
   3.3 **Aircraft Registration** ...................................................................................................................... 4  
   3.4 **Flight Crew Requirements and Qualifications** ............................................................................... 5  
   3.5 **Operational Areas** ......................................................................................................................... 7  
   3.6 **Flight Plan Review** ........................................................................................................................ 8  
   3.7 **Pre-Flight Check** ........................................................................................................................... 9  
   3.8 **Accident Reporting** ....................................................................................................................... 9  
   3.9 **Data Collection and Management** ................................................................................................ 9  

APPENDIX A: **Flight Plan Review Form** ...................................................................................................... 11  
APPENDIX B: **Preflight Checklist Items** ...................................................................................................... 13
1. Scope
This document describes the procedure for NDSU faculty, staff, and students to use small unmanned aircraft systems for university purposes under the Title 14 Code of Federal Regulations (14 CFR) Part 107 Small Unmanned Aircraft System.

2. Background Information
The Federal Aviation Administration considers Unmanned Aircraft Systems (UAS), both large and small, to be similar to manned aircraft with respect to regulatory processes and operational practices. As such, it is not simply a matter of purchasing a small UAS and then integrating it into one’s research project.

Unmanned aircraft may be operated (flown) outdoors under one of three categories; public, civil, and model aircraft. Additional information about these categories can be found at the following web link: http://www.faa.gov/uas/

Public Aircraft Operations (Governmental): This is the category of operation by which government agencies and universities can conduct UAS flight operations for a variety of government purposes. This might include law enforcement, disaster response, or other related applications. It can also include university research. These operations are conducted under a certificate of authorization (COA) that is issued by the FAA.

Civil Aircraft Operations: Any operation that does not meet the statutory criteria for a public aircraft operation is considered a civil aircraft operation. The FAA previously established an exemption process (referred to as a Section 333 exemption) that allowed commercial operations in low-risk, controlled environments. On August 29, 2016, a new set of regulations, commonly referred to as the small UAS rule, went into effect. These regulations provide a new legal basis for flying small UAS in low risk scenarios.

Model Aircraft Operations: Model aircraft operations can be conducted for hobby or recreational purposes only. In many cases the model aircraft might be physically the same or similar to those flown under Public or Civil Operations, but it is the intended use that determines the type of operation. UAS flight operations conducted for research purposes by an NDSU employee or student could not be conducted under hobbyist model aircraft rules.

Operations Not Involving Outdoor Flights: The use of unmanned aircraft for research activities not involving outdoor flights is not regulated by the FAA.

Through August 2016 NDSU has operated UAS for research as a Public Aircraft Operation utilizing COAs issued to the Northern Plains UAS Test Site. As of August 29, 2016 the Part 107 small UAS rule is in effect, allowing flight operations without COAs or exemptions. This will be a Civil Aircraft Operation, but can be done for any purpose (commercial, training, research, etc.) as long as the flights comply with the rule. NDSU flight operations that do not comply with the Part 107 SUAS rules will still need to be conducted under COAs with the NP UAS TS. Examples of this might be larger aircraft or flights above 400’ AGL.
3. Procedure for Unmanned Aircraft Flight Operations Under the FAA small UAS Rule

The set of requirements that must be followed are described in 14 CFR Part 107. In addition, an Advisory Circular AC 107-2 was issued by the FAA to provide guidance information for compliance with Part 107. An abbreviated list of some of the requirements includes the following:

- Unmanned aircraft must weigh less than 55 lbs. (25 kg)
- The aircraft must be operated within visual line-of-sight (VLOS) only.
- May not operate over any persons not directly participating in the flight operation.
- Daylight-only operations.
- Maximum altitude of 400 feet above ground level or within 400 feet of a structure.
- Minimum weather visibility of 3 miles from the ground control station.
- A person operating a small UAS must either hold a remote pilot airman certificate with a small UAS rating or be under the direct supervision of a person who holds a remote pilot certificate (remote pilot in command).
- The remote pilot in command must conduct a preflight inspection.
- A person may not act as a remote pilot in command for more than one unmanned aircraft at one time.

3.1 Project Coordination and Support

The Part 107 small UAS rule greatly simplifies the process for operating small UAS under many conditions, however, there are numerous FAA requirements that must be complied with to operate legally under the rule. Project personnel must be cognizant of these requirements and must comply with all rules. A point of contact at NDSU for assistance with the process is:

NDSU UAS Coordinator
Aaron Reinholz, NDSU Office of Research and Creative Activity
Research 2 Office 102E; aaron.reinholz@ndsu.edu  Ph. (701) 231-5338

3.2 Aircraft Insurance

Small unmanned aircraft flight operations that are being conducted by NDSU employees under the requirements of the small UAS rule (14 CFR Part 107) are covered under the North Dakota Risk Management Fund for liability. A separate commercial insurance policy is not required.

With respect to damage to the aircraft from either flight activities or non-flight events, neither the Risk Management Fund nor the State Fire and Tornado fund will cover such damage to an unmanned aircraft. Coverage for damage to the aircraft or any attached payloads would need to be procured separately by the researcher if desired.

3.3 Aircraft Registration

The FAA requires that each aircraft be registered and that the registration number be marked on the aircraft. The FAA has implemented a greatly simplified process to register unmanned aircraft online. This process takes only a few minutes and a registration number will be provided immediately. The
make, model, and serial number information are all that is needed to complete this process. After the registration number is obtained the aircraft must be marked. Figure 1 describes the FAA’s instructions for marking the unmanned aircraft. The registration information must be provided to the NDSU UAS Coordinator.

![Figure 1: Marking Instructions for Registration Number](image)

**3.4 Flight Crew Requirements and Qualifications**

A remote Pilot in Command (PIC) must possess an FAA issued remote pilot certificate for flight operations under the Part 107 UAS rule. Typically, the PIC would be the person operating the aircraft, but the Part 107 rule does allow for operations by someone who would be under the direct supervision of a person that holds a remote pilot certificate. “Direct Supervision” requires that the PIC is able to immediately take direct control of the sUAS to quickly address a hazardous situation. This would generally require the PIC to be in close proximity to the person operating the aircraft.

A mission commander is not required.

A Visual Observer may be used, but is not required.

A medical certificate is not required for a remote pilot certificate. A person may not, however, participate in the operation of an sUAS if they know or have reason to know that they have a physical or mental condition that could interfere with the safe operation of the sUAS.

An FAA issued remote pilot certificate can be obtained in one of two ways.

1) Take the aeronautical knowledge test
   - Acquire the necessary knowledge to pass the test either by self-study or by taking a course (in-person or online) to prepare.
   - Take the test at an official FAA testing center. In Fargo, tests are given at the Fargo Jet Center. There is a $150 fee for taking the test.
   - If the test is successfully passed, complete an application for a remote pilot certificate (FAA Form 8710-13). The online process ([https://iacra.faa.gov/iacra](https://iacra.faa.gov/iacra)) is highly recommended (see appendix B for details), however, a paper application process is also available.
   - After the online application is submitted there is a Transportation Security Administration (TSA) vetting process to complete a background security check of the
applicant. Once the TSA vetting process is completed, the applicant will receive an e-mail notifying them that a temporary certificate can be printed. This is valid for up to 120 calendar days.

- After other FAA processing is complete, a permanent certificate will be issued to the applicant.
- The aeronautical knowledge test must be completed once every 24 calendar-months for the certificate to continue being valid.
- If a person fails the aeronautical knowledge test, they must wait at least 14 calendar days before applying to retake the test.

2) If a person holds a part 61 pilot certificate (a student pilot certificate does not qualify), and has completed a flight review within the previous 24 calendar-months they may use the following process in-lieu of taking the aeronautical knowledge test:

- Complete the online course (Part 107 small UAS) located within the FAA Safety Team web site (www.faasafety.gov) and receive a completion certificate.
- Complete an application for a remote pilot certificate (FAA Form 8710-13). The online process is highly recommended https://iacra.faa.gov/iacra/ (see appendix B for details), however, a paper application process is available.
- Contact a FSDO (Flight Standards District Office) to make an appointment to validate the applicant’s identification. The applicant must present the completed 8710-13 form, the online course completion certificate, and proof of a current flight review.
  - Fargo FSDO Location: 4620 Amber Valley Parkway Fargo, North Dakota. Phone: (701) 492-5800.
- After verifying the application, the FSDO representative will issue a temporary remote pilot certificate.
- After other FAA processing is complete, a permanent remote pilot certificate will be issued to the applicant.
- There is a $50 fee for the application process.

Note: As an alternative to contacting the FSDO, a Designated Pilot Examiner (DPE), an Airman Certification Representative (ACR), or a Certified Flight Instructor (CFI) may also validate the applicant’s identification, however a CFI will not be able to issue a temporary remote pilot certificate.

In addition to holding a Remote Pilot Certificate, the Pilot in Command must attain proficiency in actual operation of the specific aircraft that will be flown. This can be accomplished in one of several ways.

- For PICs that have already been flying aircraft under the NP UAS Test Site COAs they will have been trained already in specific aircraft that are being flown under current NDSU research projects.
- Obtain training from the aircraft manufacturer, aircraft distributor, or other 3rd party if available. This is highly recommended for any aircraft, but in particular for fixed wing aircraft.
- Obtain training under the guidance and supervision of a PIC that is already proficient in that aircraft type or a similar aircraft. This could be another NDSU researcher.
3.5 Operational Areas

Flight operations are allowed within Class G airspace without permission from Air Traffic Control. Most of the airspace throughout North Dakota and neighboring states under 400’ AGL is Class G with the exception of some airport areas. The following areas in North Dakota have Class D and/or E airspace: Fargo, Jamestown, Bismarck, Dickinson, Williston, Minot, Minot AFB, Devils Lake, Grand Forks AFB, and Grand Forks. Figures 2 and 3 highlight in red shading those particular areas.

Figure 2: UAS Flight Limitations in Eastern North Dakota Locations.
Operations within Class B, C, D and E airspace may be allowed if permission is received from Air Traffic Control. If operations in these areas are desired, contact the NDSU UAS Coordinator to pursue discussion with the appropriate FAA personnel. Note that the entirety of the NDSU campus in Fargo lies within Class D Airspace, thus approval from the FAA will need to be obtained for any flights.

3.6 Flight Plan Review

A Flight Plan form will be filled out for each project that will utilize UAS and is to be submitted to the NDSU UAS Coordinator. The form will be reviewed to ensure the necessary information has been supplied and that the proposed flights meet the criteria for the small UAS rule. The form should be updated and resubmitted if there are substantial changes during the project. Examples would include a different pilot, different aircraft, or different locations for the flights.

A review committee will consider the privacy/ethics aspects of the proposed flight operations.

- If the proposed flights are routine and follow a standard, already accepted protocol, the committee may approve by electronic consensus. An example of this might be agriculture...
flights or other similar applications that would be in rural, sparsely populated areas away from towered airports over land that is either owned by NDSU or by collaborating landowners/farmers.

- If proposed flights are more complex in some way or generate any questions or concerns, an in-person review by the committee with the project PI may be scheduled. An example of this might be a flight to be conducted over an urban area, near a towered airport, etc.

The review committee will consist of the NDSU UAS Advisory Panel and additional at-large members as deemed necessary.

The Flight Plan form can be found in Appendix A.

### 3.7 Pre-Flight Check

Prior to every flight, the remote Pilot in Command is responsible for conducting a check of the sUAS and verifying that it is in a condition for safe operation. A preflight checklist for each specific aircraft type should be developed if not already provided by the manufacturer. Guidance for the preflight check is found in AC 107-2 section 7.3.4 and is provided in Appendix B of this document.

### 3.8 Accident Reporting

The remote PIC of the sUAS is required to report an accident to the FAA within 10 days if it meets any of the following thresholds:

- Serious injury to any person or any loss of consciousness. A serious injury is an injury that qualifies as Level 3 or higher on the Abbreviated Injury Scale.
- Damage to any property, other than the small unmanned aircraft, if the cost is greater than $500 to repair or replace the property (whichever is lower).

The report is submitted to the FAA Regional Operations Center either electronically (www.faa.gov/uas/) or by phone (817-222-5006).

An incident report must be submitted to the NDSU Safety Office and is also to be provided to the NDSU UAS Coordinator.

### 3.9 Data Collection and Management

Careful consideration needs to be given for any data that will be collected during UAS flights, particularly aerial image sensor data. A few questions to consider are as follows:

- What areas will be imaged? Is it NDSU property? Other public property? Private property?
- During the flights is it possible you would be imaging over adjacent land that is not part of the project? If so, might that imagery be sensitive and if so how will that be handled?
- Where will you store the data? How much storage capacity will be needed?
- Who will have access to the data? Does it need to be secured?
- How long will the data need to be stored before being destroyed?

Answers to these types of questions should be determined as the project is being planned. PIs should also be aware that data collected for projects could be subject to open record requests under ND open record laws. If such a request were made it would be reviewed by legal counsel from the ND Attorney General’s office to determine what data must be released in response to the request. This information should be conveyed by PIs to any collaborators on their projects.
Version 1.0

--------------------------------------------------------------------------------------------------------------------------------------

REVISION HISTORY

V1.0  Initial Release
V1.1  Updated the data collection section 3.9 and the corresponding section in Appendix A. Several other minor changes implemented for clarification.
APPENDIX A: Flight Plan Review Form

Principal Investigator (PI): Click here to enter text.

Department/Organization: Click here to enter text.

Purpose: Provide a detailed description of the purpose for the UAS flights.

Anticipated Flight Dates: Click here to enter a date.

Aircraft Type (Make/Model): ___________________

Registration #: ___________________

Sensor(s): ___________________

Pilot-in-Command: ___________________

Valid Remote Pilot Certificate _____ (√)

Proficiency with aircraft type: Previous experience with aircraft type _____ (v)

Taking a Training Course _____ (v)

If neither, describe the plan for the PIC to attain proficiency

Pre-flight checklist developed for the aircraft? _____ (v)

Flight Location(s): Describe the locations where flights are to be conducted.

Class G Airspace _____ (v)

Class B, C, D, or E Airspace _____ (v) Requires Air Traffic Control Approval

University owned or leased land _____ (v)

Other public land _____ (v)

Private Property _____ (v)

Is IACUC or IRB approval required for any aspect of your project?

Aerial Sensor Data Management and Security

Careful consideration must be given for any aerial sensor data (imagery or other types of sensor information) that will be collected during UAS flight operations. Provide a detailed description of the type of aerial sensor data you will be recording during UAS operations.

Could the aerial sensor data be potentially perceived as sensitive information from a privacy and ethics standpoint? Consider not only data over the intended land area to be imaged, but also adjacent land that may be imaged unintentionally.
If no, please explain.

If yes, please answer the following questions.

- What methods will be used to mitigate or minimize this potential?
- Where will the data be stored?
- How will the data be secured?
- Who will maintain responsibility for the data?
- Provide a list of all personnel who will have access to the data.
- How long will the data be stored before being destroyed?

Please describe any other aspects of your UAS flight plans that could be ethically problematic.
APPENDIX B: Preflight Checklist Items

1. Visual condition inspection of the UAS components;
2. Airframe structure (including undercarriage), all flight control surfaces, and linkages;
3. Registration markings, for proper display and legibility;
4. Moveable control surface(s), including airframe attachment point(s);
5. Servo motor(s), including attachment point(s);
6. Propulsion system, including powerplant(s), propeller(s), rotor(s), ducted fan(s), etc.;
7. Verify all systems (e.g., aircraft and control unit) have an adequate energy supply for the intended operation and are functioning properly;
8. Avionics, including control link transceiver, communication/navigation equipment, and antenna(s);
9. Calibrate UAS compass prior to any flight;
10. Control link transceiver, communication/navigation data link transceiver, and antenna(s);
11. Display panel, if used, is functioning properly;
12. Check ground support equipment, including takeoff and landing systems, for proper operation;
13. Check that control link correct functionality is established between the aircraft and the CS;
14. Check for correct movement of control surfaces using the CS;
15. Check onboard navigation and communication data links;
16. Check flight termination system, if installed;
17. Check fuel for correct type and quantity;
18. Check battery levels for the aircraft and CS;
19. Check that any equipment, such as a camera, is securely attached;
20. Verify communication with UAS and that the UAS has acquired GPS location from at least four satellites;
21. Start the UAS propellers to inspect for any imbalance or irregular operation;
22. Verify all controller operation for heading and altitude;
23. If required by flight path walk through, verify any noted obstructions that may interfere with the UAS; and
24. At a controlled low altitude, fly within range of any interference and recheck all controls and stability.