October 9, 2019 Meeting

The October 9, 2019 Waterloo Technical Society (WTS) meeting was called to order by President Stevenson at 7:20 pm. President Stevenson welcomed visitors and noted that this was the second meeting of the 106th year of the Society.

A total of 30 members and guests attended.

Treasurer's Report. Ken Friend reported a beginning balance of $737.47. With $400.00 income from paid memberships and expenses of $20.00 for the September speakers' meal this leaves a new balance of $1,117.47. Treasurer Friend's report stated a total of 8 honorary and 22 paid members yielding a membership roster of 30 members.

Slate of Officers. Officers for the 2019-2020 year (year 106) were presented:

President:	Jim Stevenson
Co-Vice Presidents:	Jerry Mohling and Steve Crouse
Treasurer:	Kenneth Friend and Paul Anderson
Dinner Reservations:	Derek Eagles and Steve Lang
Secretary:	James Stevenson
Publicity/Recognition:	Vacant
Auditing:	Bill Mitchell and Jim Garrett
Nominating Committee:	Ralph Marrero
Web Site:	Tim Schoenfelder

Old Business. The topics for this year were reviewed. The dates, speaker and topics for the 106th WTS are:
Speakers for the 2018-2019 Meeting Year (Year 106)

September 11, 2019, Communication Technology, Hillary Menken, Talk to Me Technologies
October 9, 2019. Photojournalism Drones. Daniel Hampe, KWWL.
November 13, 2019. Infrared Thermopile Sensor Arrays. Dr. Jeffrey Nie, UNI.
January 8, 2020. Education Technology, Schindler Tour. Dr. Leigh Zeitz, UNI.
February 12, 2020. University Avenue Reconstruction. Michelle Sweeney, AECOM.
March 11, 2020. Website Development. Marc Reifenrath, SpinUTech.
April 8, 2020. Electric Bicycles. Brent Johnson, BikeTech.
May 13, 2020. Hearing Devices. John Sperry, Wolfe Clinic.

Discussion on the May 2018 motion to donate $250 to Tiny House Program at UNI concluded with a decision to identify where donations have been made and prioritize alternatives for donations for action at the November 13, 2019 meeting. President Stevenson and Treasurer Friend are to make a list and members to identify possible recipients. President Stevenson requested members to identify deserving entities in order to have discussion at the November 13, 2019 meeting. Item tabled until the November 2019 meeting. No discussion on this topic.

New Business. No new business discussed.

Guest Speaker.**Daniel Hampe** is a four time Emmy nominee for his work in photojournalism at KWWL. He grew up in Iowa Falls and graduated high school in 2012. He received an Associate of Arts degree from Kirkwood Community College in Cedar Rapids before transferring to UNI in 2014 where he earned his Bachelor of Arts degree in Electronic Media Production and Performance. He feels fortunate to find a job in his career field so close to home and started at KWWL in September of 2016. He has worked there for over 3 years now and was promoted to Chief of Photography in May of this year.

Drones in Photojournalism. Daniel spoke to the creative uses of drones. Whether that be for severe weather coverage or adding an extra element to KWWL day to day stories. He also be talked about the precautions and safety measures taken to ensure safe drone flights as well as the challenges faced in fight planning.



To help members visualize equipment used in photojournalism, Daniel brought the equipment pack which contained a two-way radio for him to communicate with the airport tower controller, a four-post drone with gimbal to mount the GoPro camera, and additional batteries. The drone has a 15 to 20 minute life in the summer; half that in the winter. The drone must be visible to the operating team at all times. For this reason, the operator has an observer to view the drone while the operator watches the app on the cell phone displaying video from the GoPro camera mounted on the drone's gimbaled platform. Every drone over 55 pounds must be registered with the FAA. The drone may be flown from 30 minutes before dawn to 30 minutes after sunset (see Appendix I). Video is transmitted to the cell phone during use as well as keeping video on a SIM card in the GoPro camera. The drone must be visible at all times so the flight path must be within three miles of the operator in calm winds (speeds less than 25 mph).

The FAA considers drones as Unmanned Aircraft Systems (UAS). For this reason, there are two types of drone operators: recreational flyers and commercial operators. Recreational flyers do not have to have FAA Part 107 licenses. Commercial operators have to successfully pass the FAA Part 107 license exam and retest every two years to keep the license current. With the popularity of drones increasing, the FAA is considering requiring recreational flyers to have licenses.

Restrictions. The greatest restriction on drone use is airspace, especially near airports. There are several categories of airspace restrictions. Class D airspace is shown in Figure 1.

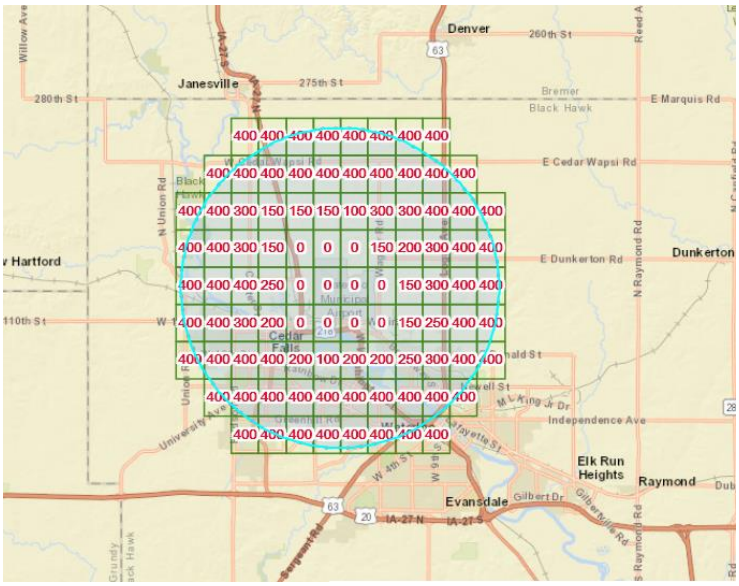
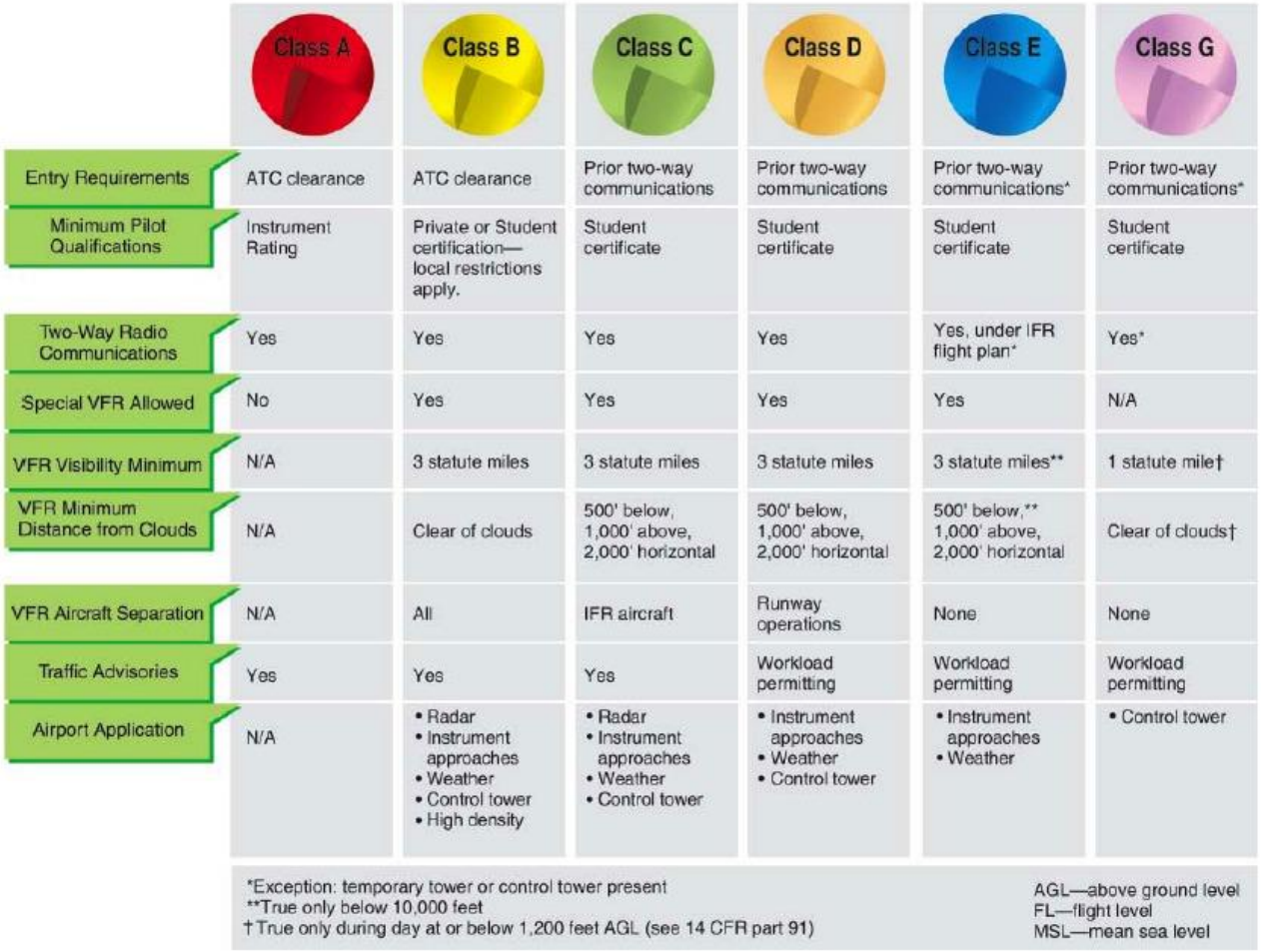


Figure 1 Waterloo Airport drone flying height restrictions. Values are ceiling heights.

Some operations are not covered by Part 107 and require a waiver. Here are some common examples of Part 107 sections that are subject to waiver:

- Operation from a moving vehicle or aircraft (§ 107.25) *
- Daylight operation (§ 107.29)
- Visual line of sight aircraft operation (§ 107.31) *
- Visual observer (§ 107.33)
- Operation of multiple small unmanned aircraft systems (§ 107.35)
- Yielding the right of way (§ 107.37(a))
- Operation over people (§ 107.39)
- Operation in certain airspace (§ 107.41)
- Operating limitations for small unmanned aircraft (§ 107.51)



	Class A	Class B	Class C	Class D	Class E	Class G
Entry Requirements	ATC clearance	ATC clearance	Prior two-way communications	Prior two-way communications	Prior two-way communications*	Prior two-way communications*
Minimum Pilot Qualifications	Instrument Rating	Private or Student certification—local restrictions apply.	Student certificate	Student certificate	Student certificate	Student certificate
Two-Way Radio Communications	Yes	Yes	Yes	Yes	Yes, under IFR flight plan*	Yes*
Special VFR Allowed	No	Yes	Yes	Yes	Yes	N/A
VFR Visibility Minimum	N/A	3 statute miles	3 statute miles	3 statute miles	3 statute miles**	1 statute mile†
VFR Minimum Distance from Clouds	N/A	Clear of clouds	500' below, 1,000' above, 2,000' horizontal	500' below, 1,000' above, 2,000' horizontal	500' below,** 1,000' above, 2,000' horizontal	Clear of clouds†
VFR Aircraft Separation	N/A	All	IFR aircraft	Runway operations	None	None
Traffic Advisories	Yes	Yes	Yes	Workload permitting	Workload permitting	Workload permitting
Airport Application	N/A	• Radar • Instrument approaches • Weather • Control tower • High density	• Radar • Instrument approaches • Weather • Control tower	• Instrument approaches • Weather • Control tower	• Instrument approaches • Weather	• Control tower

*Exception: temporary tower or control tower present
**True only below 10,000 feet
† True only during day at or below 1,200 feet AGL (see 14 CFR part 91)

AGL—above ground level
FL—flight level
MSL—mean sea level

Figure 2. FAA airspace classifications.

Daniel showed video from KWWL broadcasts that were examples of how the story was enhanced through drone video. These stories were:

- Harvest, neighbors helping get the crop in for a disabled farmer
- Bremer Count Sheriff, asking for snowmobiles to help reach remote emergencies in deep snow
- Severe weather, damage from an EF-1 Tornado in Charles City, Iowa
- Independence flooding, effects of water from the Wapsipinicon River in Independence, Iowa
- Marshalltown tornado, damage from an EF-3 tornado in Marshalltown, Iowa
- Promotional videos, highlighting "we've got you covered in…" in Waterloo, Cedar Rapids, Dubuque, Decorah, Elkader, Waverly and fifteen other communities in Northeast Iowa
- Weather B-roll, shots of weather changes in each of the four seasons. This is one of the biggest uses of drone video. Usually done each season each year

Flight logs and planning. Flight planning and checklist is shown in Appendix II. Plans have to consider street crossings, gas stations, pedestrian presence and details down to the smallest item. The operator has to be aware of surrounding activity at all times. Weather conditions below 500 feet have to be considered in the plan.

Meeting adjourned at 8:20 pm.

Next Meeting. The next meeting will be November 13, 2019. Dr. Jeff Nie, UNI professor of Electrical and Electronic Engineering Technology, will speak about Infrared Thermopile Sensor Arrays.

Respectfully submitted,

James R. Stevenson, President and Secretary

APPENDIX I

SUMMARY OF SMALL UNMANNED AIRCRAFT RULE (PART 107)

June 21, 2016

Operational Limitations

- Unmanned aircraft must weigh less than 55 lbs. (25 kg).
- Visual line-of-sight (VLOS) only; the unmanned aircraft must remain within VLOS of the remote pilot in command and the person manipulating the flight controls of the small UAS. Alternatively, the unmanned aircraft must remain within VLOS of the visual observer.
- At all times the small unmanned aircraft must remain close enough to the remote pilot in command and the person manipulating the flight controls of the small UAS for those people to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses.
- Small unmanned aircraft may not operate over any persons not directly participating in the operation, not under a covered structure, and not inside a covered stationary vehicle.
- Daylight-only operations, or civil twilight (30 minutes before official sunrise to 30 minutes after official sunset, local time) with appropriate anti-collision lighting.
- Must yield right of way to other aircraft.
- May use visual observer (VO) but not required.
- First-person view camera cannot satisfy “see-and-avoid” requirement but can be used as long as requirement is satisfied in other ways.
- Maximum groundspeed of 100 mph (87 knots).
- Maximum altitude of 400 feet above ground level (AGL) or, if higher than 400 feet AGL, remain within 400 feet of a structure.
- Minimum weather visibility of 3 miles from control station.
- Operations in Class B, C, D and E airspace are allowed with the required Air Traffic Controller (ATC) permission.
- Operations in Class G airspace are allowed without ATC permission.
- No person may act as a remote pilot in command or VO for more than one unmanned aircraft operation at one time.
- No operations from a moving aircraft.
- No operations from a moving vehicle unless the operation is over a sparsely populated area.
- No careless or reckless operations.
- No carriage of hazardous materials.
- Requires preflight inspection by the remote pilot in command.
- A person may not operate a small unmanned aircraft if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of a small UAS.
- Foreign-registered small unmanned aircraft are allowed to operate under part 107 if they satisfy the requirements of part 375.
- External load operations are allowed if the object being carried by the unmanned aircraft is securely attached and does not adversely affect the flight characteristics or controllability of the aircraft.
- Transportation of property for compensation or hire allowed provided that-
  - o The aircraft, including its attached systems, payload and cargo weigh less than 55 pounds total;
  - o The flight is conducted within visual line of sight and not from a moving vehicle or aircraft; and
  - o The flight occurs wholly within the bounds of a State and does not involve transport between (1) Hawaii and another place in Hawaii through airspace outside Hawaii; (2) the District of Columbia and another place in the District of Columbia; or (3) a territory or possession of the United States and another place in the same territory or possession.

Most of the restrictions discussed above are waivable if the applicant demonstrates that his or her operation can safely be conducted under the terms of a certificate of waiver.

Remote Pilot in Command Certification and Responsibilities

- Establishes a remote pilot in command position.
- 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 does hold a remote pilot certificate (remote pilot in command).
- To qualify for a remote pilot certificate, a person must:
  - Demonstrate aeronautical knowledge by either:
    - Passing an initial aeronautical knowledge test at an FAA-approved knowledge testing center; or
    - Hold a part 61 pilot certificate other than student pilot, complete a flight review within the previous 24 months, and complete a small UAS online training course provided by the FAA.
  - Be vetted by the Transportation Security Administration.
  - Be at least 16 years old.
- Part 61 pilot certificate holders may obtain a temporary remote pilot certificate immediately upon submission of their application for a permanent certificate. Other applicants will obtain a temporary remote pilot certificate upon successful completion of TSA security vetting. The FAA anticipates that it will be able to issue a temporary remote pilot certificate within 10 business days after receiving a completed remote pilot certificate application.
- Until international standards are developed, foreign- certificated UAS pilots will be required to obtain an FAA-issued remote pilot certificate with a small UAS rating.

A remote pilot in command must:

- Make available to the FAA, upon request, the small UAS for inspection or testing, and any associated documents/records required to be kept under the rule.
- Report to the FAA within 10 days of any operation that results in at least serious injury, loss of consciousness, or property damage of at least $500.
- Conduct a preflight inspection, to include specific aircraft and control station systems checks, to ensure the small UAS is in a condition for safe operation.
- Ensure that the small unmanned aircraft complies with the existing registration requirements specified in § 91.203(a)(2).

A remote pilot in command may deviate from the requirements of this rule in response to an in-flight emergency

Aircraft Requirements

- FAA airworthiness certification is not required. However, the remote pilot in command must conduct a preflight check of the small UAS to ensure that it is in a condition for safe operation.

Model Aircraft

- Part 107 does not apply to model aircraft that satisfy all of the criteria specified in section 336 of Public Law 112-95.
- The rule codifies the FAA's enforcement authority in part 101 by prohibiting model aircraft operators from endangering the safety of the NAS.

APPENDIX II

Drone (Unmanned Aircraft Systems, UAS) Log and Checklist

# UAS Flight Log			**Mission #**
Mission/Flight Plan			
Pilot Name:		RP Cert. #:	
Address:		Phone:	
Visual Observer(s):			
Location:			
Date:		Aircraft Type/Name:	
Planned Time:		Aircraft Certificate #:	
Estimated Mission Duration:		Mission Type (VFR, IFR):	
Airports within 5 miles:			
Waivers Applied for:			
Mission Description/Route:			

Mission/Flight Record			
Flight 1	Takeoff Loc:	Launch Time:	Flight Notes:
	Landing Loc:	Landing Time:	
	Battery # and Voltage:	Elapsed Time:	
Flight 2	Takeoff Loc:	Launch Time:	Flight Notes:
	Landing Loc:	Landing Time:	
	Battery # and Voltage:	Elapsed Time:	
Flight 3	Takeoff Loc:	Launch Time:	Flight Notes:
	Landing Loc:	Landing Time:	
	Battery # and Voltage:	Elapsed Time:	
Flight 4	Takeoff Loc:	Launch Time:	Flight Notes:
	Landing Loc:	Landing Time:	
	Battery # and Voltage:	Elapsed Time:	
Mission Notes:			

UAS Mission Checklists

Mission #:

Mission Checklist

☐	Airport(s) Notified:	☐	UAV Batteries Charged	☐	Gimbal Protector Installed
☐	Location is OK to fly		Battery 1 volts:	☐	Propellers Packed
☐	Weather Forecast OK		Battery 2 volts:	☐	Cables Packed
	Temperature:		Battery 3 volts:	☐	Camera Filters Packed
	Wind:		Battery 4 volts:	☐	Sun Shade Packed
	Precipitation:	☐	Controller Charged	☐	Tools Packed
☐	Firmware up-to-date	☐	Tablet Charged	☐	Flight Plan designed/entered in software
☐	MicroSD Card Formatted	☐	Mobile Phone Charged	☐	Log Book Packed

Launch Site Checklist

☐	Verify Weather is OK to Fly	☐	Check for obstacles, interference
	Temperature:	☐	Check for nearby human activity/dangerous situations
	Wind:	☐	Verify Launch Pad is down-wind from observers
	Precipitation:	☐	Launch Pad/Barriers Placed
☐	**Safety Briefing**		

Equipment Checklist

☐	Airframe/Landing gear inspected	☐	SD Card Installed	☐	Gimbal/Lens Protector Removed
☐	Propellers Inspected/Attached	☐	Battery Installed	☐	Camera Filters Installed
☐	Controller/Tablet Assembled				

Pre-Flight Checklist			
☐	Aircraft Placed on Launch Pad	☐	Check RC battery level
☐	Turn on Remote Controller/Tablet/DJI Pilot App	☐	Check Aircraft Battery Level
☐	Antennas Properly Positioned	☐	Check flight mode switch (P-Mode)
☐	Turn on Aircraft	☐	Check Satellite and Compass status
☐	Check the aircraft status LEDs	☐	Set RTH Location and height
☐	Verify the gimbal is level, can move unobstructed	☐	Check camera settings

Take-Off Checklist			
☐	Check launch site is clear for take off	☐	Make sure the aircraft is stable while hovering
☐	Start the motors	☐	Check flight controls, make sure they respond as expected
☐	Take off and hover	☐	Start recording video

Post Flight Checklist					
☐	Remove Battery from Aircraft	☐	Install Gimbal Guard	☐	Repack all equipment
☐	**Complete the Flight Log**				