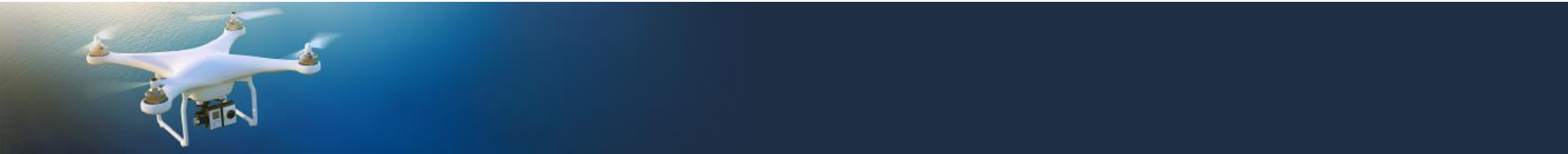
Waivers, Exemptions and Certification:

How to Get Permission to do What You Want With Your Unmanned Aircraft

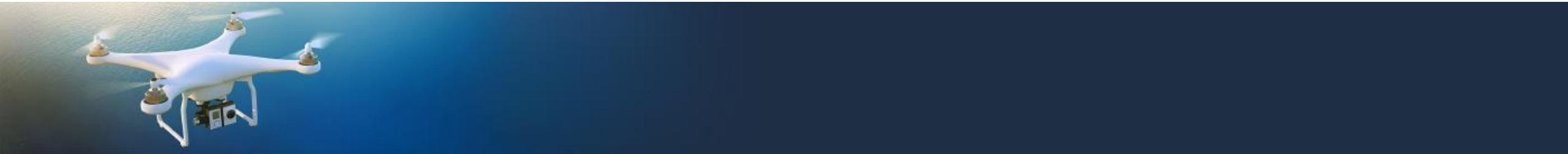
UAS Webinar Series



Presenters

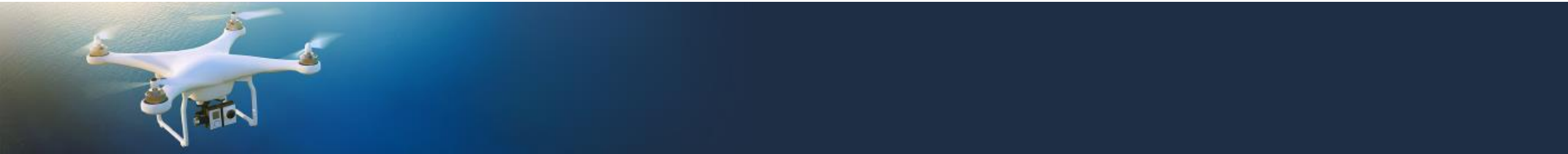
Mark Dombroff

Mark McKinnon



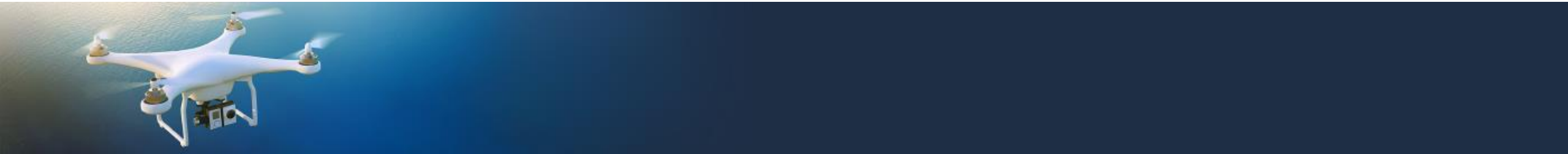
UAS Update – UAS Uniform Tort Law

- First meeting to discuss the proposed draft of the law was held in July
- Currently, aerial trespass and trespass to land are handled differently in most states
- Trespass to land carriers a presumption of injury and a right to sue
- Aerial Trespass treated more akin to nuisance law, and requires proof of actual injury
- Proposal would make all encroachment below 200’ over another person’s land an actual trespass with a presumption of damages.



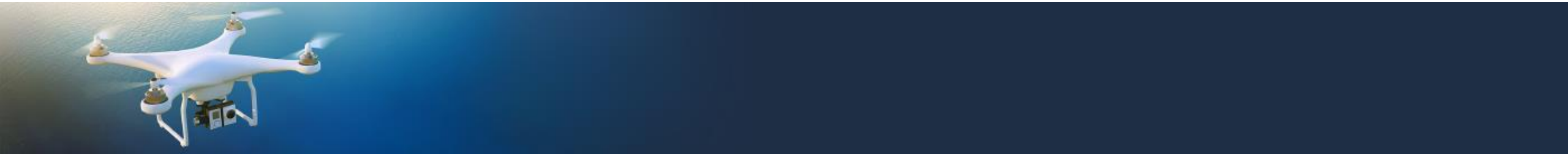
UAS Update – FAA Reauthorization

- Current Extension Expires October 1, 2018.
- 21st Century AIRR Act Scrapped
  - No ATC Privatization
- House Bill 4 (FAA Reauthorization Act of 2108)
  - Passed April 27, 2018
- S.1405 - Federal Aviation Administration Reauthorization Act of 2017
  - Reported to Committee on Commerce, Science, and Transportation on May 9, 2018
  - Introduced in Senate on June 22, 2018
  - Currently arguing on how to treat a block of about 50 amendments prior to a vote
  - Inclusion of provision on state regulation of truck rest and meal rules a potential stumbling block
  - Senate recess until August 15th



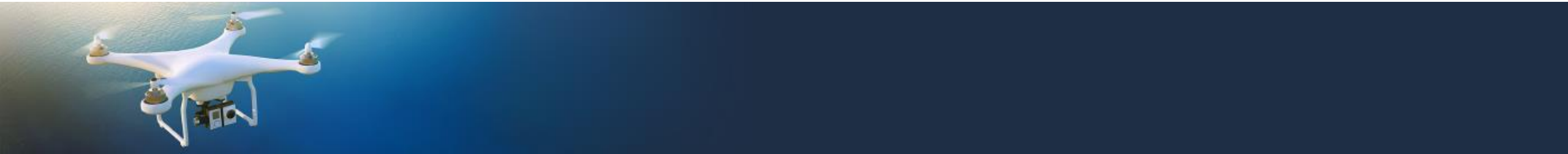
Waivers

- Waiveable sections of part 107
  - 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)



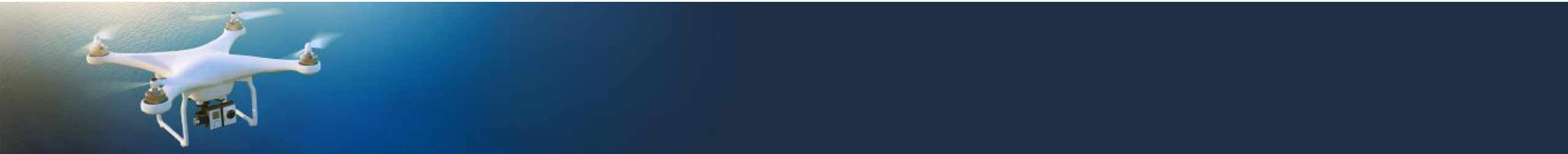
Waivers

- The safety case is the core of the application and no waiver will be granted without one
- The operator must show that the proposed operation can be conducted safely
- You must provide a complete description of the proposed operation and justification for the waiver
- The Administrator can add any terms and conditions necessary for safety
- Total number of waivers granted over the past two years – 1,954



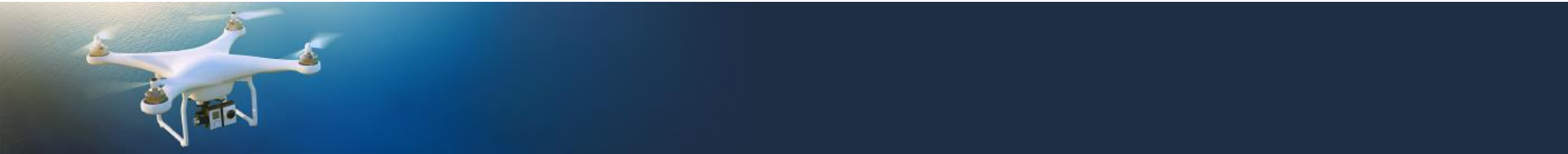
Night Operations - 107.29

- 1,785 Waivers Granted
- All operations under this Waiver must use one or more VO;
- Prior to conducting operations that are the subject of this Waiver, the remote PIC and VO must be trained, as described in the Waiver application, to recognize and overcome visual illusions caused by darkness, and understand physiological conditions which may degrade night vision. This training must be documented and must be presented for inspection upon request from the Administrator or an authorized representative;
- The area of operation must be sufficiently illuminated to allow both the remote PIC and VO to identify people or obstacles on the ground, or a daytime site assessment must be performed prior to conducting operations that are the subject of this Waiver, noting any hazards or obstructions; and
- The sUA must be equipped with lighted anti-collision lighting visible from a distance of no less than 3 statute miles. The intensity of the anti-collision lighting may be reduced if, because of operating conditions, it would be in the interest of safety to do so



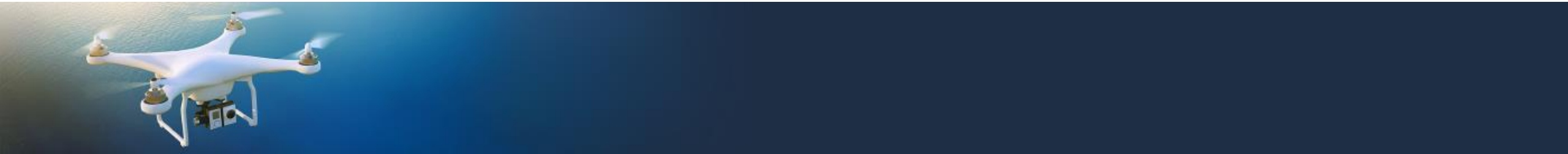
Moving Vehicle- 107.25

- Moving Vehicle- 107.2 (4 Granted)
- Prior to operations under this Waiver, all persons who will act as remote PIC, VOs, and land-based vehicle operator must participate in a safety
- The remote PIC must ensure the area ahead of the small unmanned aircraft immediately prior to the arrival of the aircraft to ensure no hazards are present;
- The remote PIC, the VO(s), and the person operating the moving land-based vehicle must be designated in advance of the commencement of the operation, and may serve only in a single role throughout the operation. For example, the person who operates the landbased vehicle may not simultaneously act as the VO;
- Any electronic communications conducted by the remote PIC, VO(s), or the land-based vehicle operator must be through the use of a hands-free full duplex communication device;
- The remote PIC and VO(s) must have an unobstructed field of view from the moving vehicle
- The sUA lost link procedure must account for the dynamic location of the remote PIC. 16.
- The sUAS must be programmed with a geo-fence to prevent sUA flight outside the location described in the waiver application



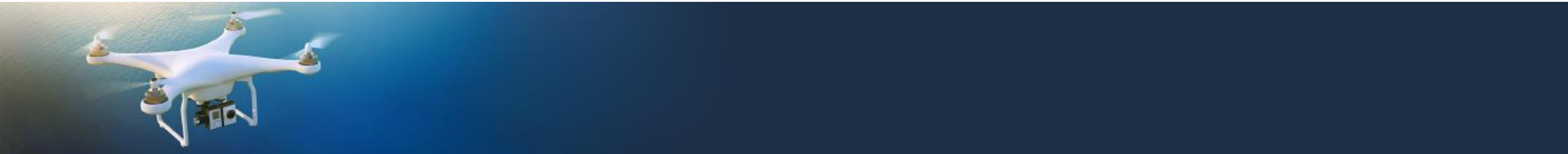
Operating Limitations (e.g. 3 mile visibility - 107.51)

- 29 Granted to date
- The sUAS must not be operated with less than 1 statute miles visibility, as observed from the control station;
- Communication between the remote PIC and VO must allow for the remote PIC to light the sUAS and/or ground the sUAS with sufficient time to yield right-of-way in accordance with §107.37
- The conspicuity of the sUAS must be increased by use of lighting visible from 3 statute miles and reflective tape contrasting to sUA colors must be attached to the sUA, as described in the waiver application;
- As described in the waiver application, when operating within 5 statute miles of any airport, airport management must be notified prior to the sUAS operation, a method of radio or telephone communication with airport management must be established, and the remote PIC or VO must monitor the airport's common traffic advisory frequency;
- As described in the waiver application, all operations conducted under this Waiver are limited to no higher than no higher than 200 feet AGL when within 2 statute miles of any airport, and no higher than 100 feet AGL if closer than 2 statute miles of an airport



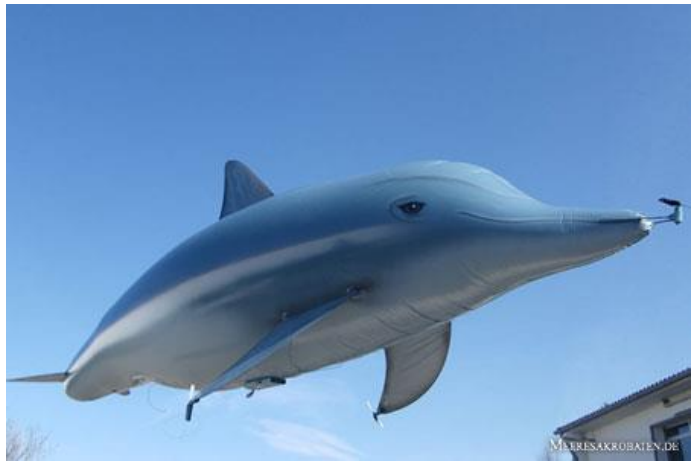
Flight over People - 107.39

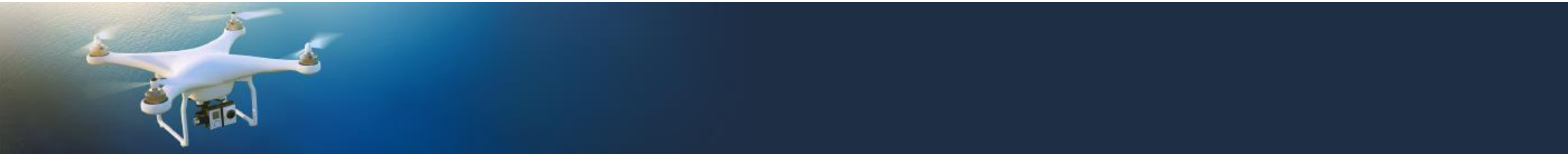
- 13 Granted to Date
- CNN
  - Detailed Operations Manual required
  - Appropriate SMS System must be in place
  - Flight only permitted over persons necessary to perform the work
  - Required to create an aircraft maintenance program
  - Extensive recordkeeping requirements
  - Very similar to the closed set Exemption Requirements
- Project Wing
  - “Transient” flight over non-participants
  - Operations manual addressing 14 areas, including:
    - The method of communications
    - Normal operating procedures
    - Abnormal operating procedures
    - Emergency procedures
    - Crew Resource Management
    - Risk management



Flight over People - 107.39

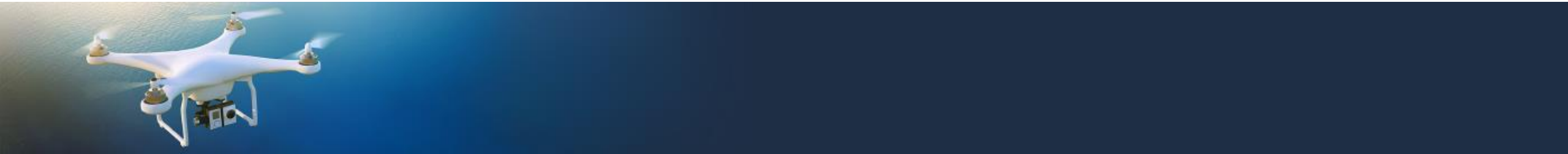
- Flight over all bystanders – Airstage
- FAA very concerned over injury potential
- Issues surrounding force threshold still undecided pending Flight over people rule
- Still limited to 25’ above the ground and a specific location - 32°45'53.25“ N and 117°13'35.79“ W





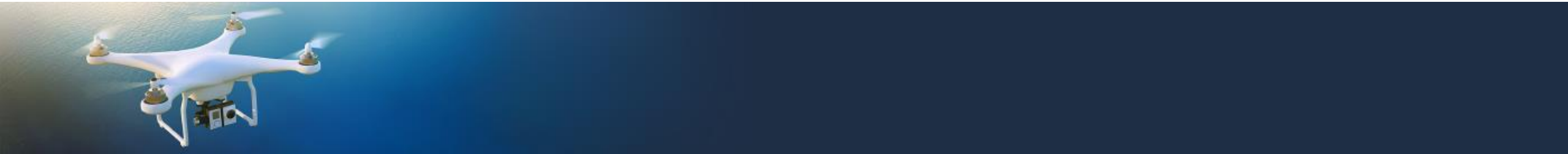
Visual line of sight aircraft operation (§ 107.31)*

- 22 Exemptions granted
- Must be sufficient VO(s) to identify any non-participating aircraft and non-participating persons prior to their entry into the operational area.
- All launch and recovery must be VLOS
- The GCS must display in real time, sUA altitude, sUA position, sUA direction of flight information, and sUA flight mode.
- The CGS must audibly or visually warn of any malfunction or loss of control
- Adequate strength of the control link must be verified before flight.
- All emitters used in the sUAS must be in compliance with all applicable FCC regulations
- Operations may not exceed 200 feet above ground level
- Flights limited to specific geographic areas



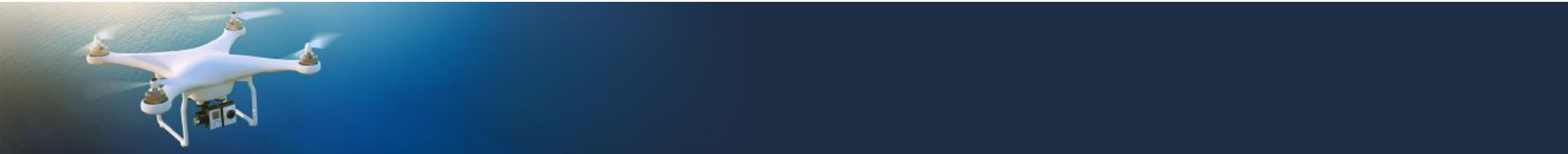
Visual line of sight aircraft operation (§ 107.31)*

- GreenSight Agronomics
- At all times, at least one person who holds a remote certificate under part 107, must maintain VLOS of sUA in order to (1) know the sUA's location, (2) determine the sUA's attitude, altitude, and direction of flight, (3) observe the airspace for other air traffic or hazards, and (4) determine that the sUA does not endanger the life or property of another. The remote pilot who is responsible for maintaining VLOS of the aircraft involved in the operations must maintain effective communication with the remote PIC who is manipulating the flight controls of the sUAS and coordinate with the remote PIC to avoid all potential collision hazards and maintain awareness of the position of the sUA throughout the entire operation
- Use limited to 6 golf courses - Arizona, California, Connecticut, Massachusettes, New Jersey, New York



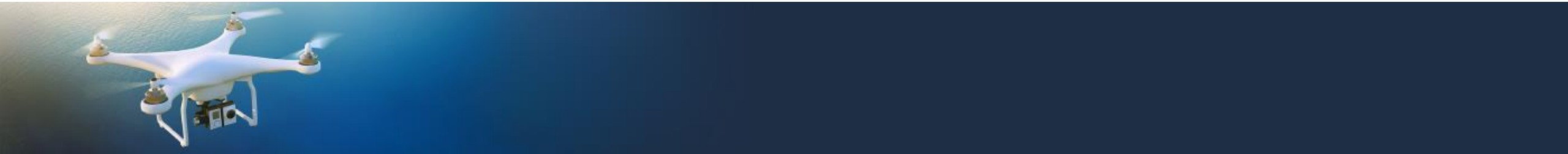
Airspace Authorizations and Waivers 107.41

- If you want to fly in controlled airspace (Class B, C, D, or surface area E), you will need to apply for an airspace authorization or airspace waiver.
- **Airspace Authorization**: An airspace authorization is the mechanism under which a proponent may seek ATC approval for their operation (please do not contact the facility directly).
- **The most efficient way to get authorization is to use LAANC if it is available**
- LAANC is the Low Altitude Authorization and Notification Capability, a collaboration between FAA and Industry. It directly supports UAS integration into the airspace.
- It provides access to controlled airspace near airports through near real-time processing of airspace authorizations below approved altitudes in controlled airspace
- FAA UAS Data Exchange has a list of approved partners and locations where the LAANC evaluation is being conducted.
- LAANC Implementation in New England in August
- LAANC Implementation in Upper Midwest in September



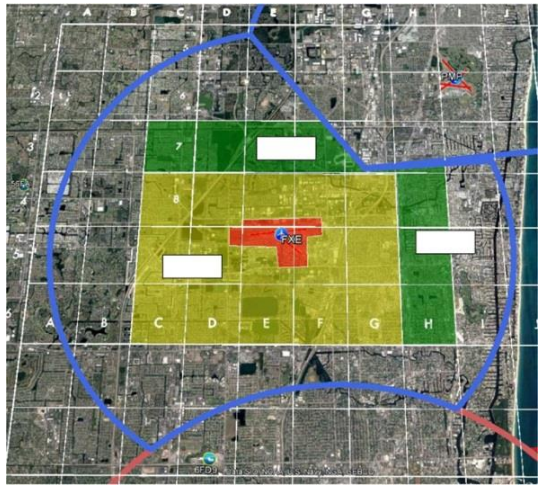
Airspace Waivers 107.41 – 109 Granted

- **Airspace Waiver:** May be issued when the proponent can demonstrate that their UAS can operate safely in controlled airspace without having to seek prior ATC authorization. Applicants for this waiver should demonstrate safety mitigations through equipage, technology and/or other operational parameters in accordance with § 107.200. Processing times for airspace waivers are significantly longer compared to airspace authorizations and require additional safety justification.
- Identify potential hazards and risks.
- Review the Waiver Safety Explanation Guidelines for 14 C.F.R. § 107.41 and describe, to the greatest extent possible, how you propose to mitigate risks associated with the hazards utilizing operating limitations, technology, training, equipment, personnel, sterile areas, etc.
- Include the reason an airspace authorization will not provide adequate relief to 14 C.F.R. § 107.41 for the proposed operation.
- The FAA will deny waiver requests submitted without hazard identification and risk mitigation strategies.



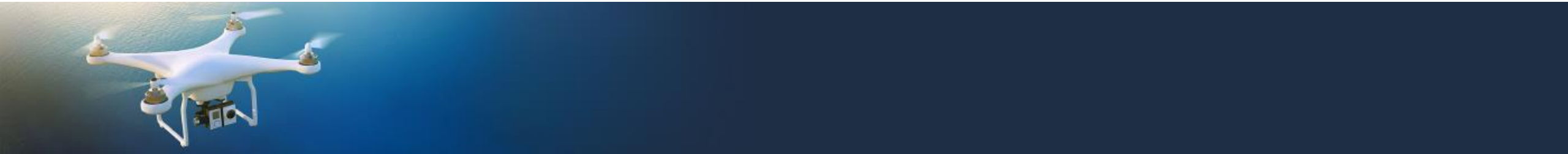
Airspace Waivers 107.41 – 109 Granted

- **Depending on the area covered, the waiver is likely to impose different restrictions based on possible flight locations**
- Responses in area closest to the airfield (AREA 1): The altitude to be flown near departure and approach ends of active runways or helicopter departure/arrival routes will be dictated by ATC and dependent on proximity so that manned aircraft flight paths will be avoided.
- Area within the Class D Airspace (AREA 2): UAS will be flown at or below 200’ or as dictated by ATC at the time of communication via cell phone. The altitudes flown near departure and approach ends of active runways or helicopter departure/arrival routes will be dictated by ATC and dependent on proximity insuring the avoidance of manned aircraft flight paths.
- d. All other areas within the FXE Class D airspace: At or below 400’ AGL.



Exemptions - Section 333

- Some types of UAS do not fit under Part 107, particularly those with a gross takeoff weight over 55 pounds.
- The existing Section 333 process is available
- Operating rules and aircraft requirements will be the same or similar to operators flying under the small UAS rule.
- Pilot requirements will be evaluated on a case-by-case basis.
- So, going forward, the Exemptions will not have the standardized numbered paragraphs for the operating restrictions that the FAA developed over the past two years.
- Total number of exemption granted over 2 years (2014-2016) – 5,551



Why Certify a UAS - BVLOS

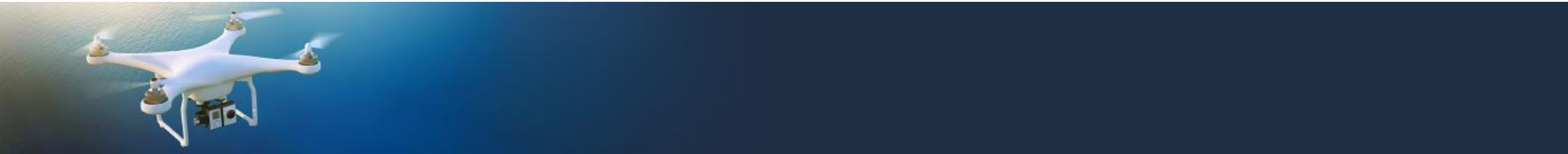
- Some BVLOS can be done with a waiver
- Three waivers Issued
- VO Line of Sight at all times
- Communication with VO required
- Required for COA:
  - Operating procedures
  - Safety assessment
  - Preflight briefing
  - Additional operating restrictions
- FAA guidance available from FAA website: Waiver Safety Explanation Guidelines

BNSF Rail Inspection

Photo – BNSF Railway Co

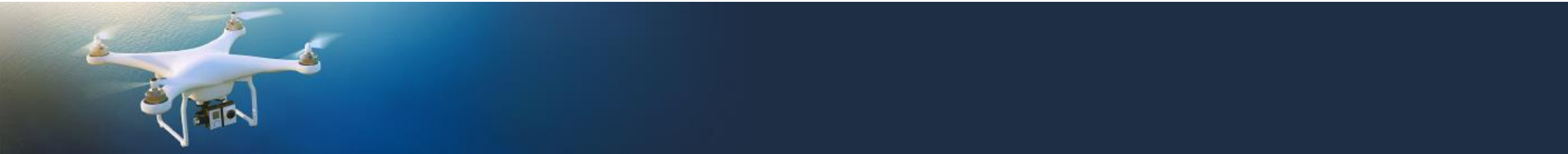
Why Certify a UAS – Flight over People

- MicroUAS ARC Proposal did not propose a certified aircraft, but as a result, relied on risk mitigation plans and operational restrictions.
- “Under Category 4, a small UAS may operate over people, including flights over crowds or dense concentrations of people prohibited in Category 3, if the manufacturer of the UAS certifies that the UAS does not, in the most probable failure modes, exceed the typical or likely impact energy threshold, if the UAS complies with industry consensus performance standards, and if the operation is conducted in compliance with a documented, risk mitigation plan, which was developed and adopted in accordance with industry consensus standards for conducting risk mitigation. The performance standards and operational restrictions that apply to Category 2 operations also apply to Category 4.”



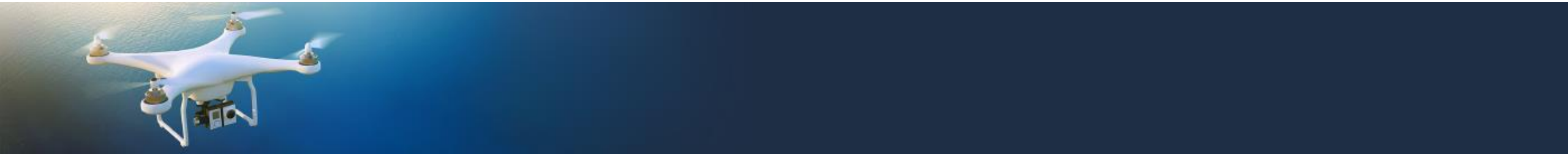
Why Certify a UAS – Flight over People

- “The ARC recommends that the industry consensus standard include the requirement of a preparation of risk mitigation plan that must address, at a minimum: (a) operator qualifications; (b) the method of approval and compliance with the risk mitigation plan, including the possibility of engagement with appropriate local entities. The ARC suggests that the standard-setting body may want to consider, as a reference, similar requirements for manned aircraft in 14 CFR 137.51.”
- **14 CFR 137.51**
- **(b)** No person may operate an aircraft over a congested area except in accordance with the requirements of this paragraph.
  - **(1)** Prior written approval must be obtained from the appropriate official or governing body of the political subdivision over which the operations are conducted.
  - **(2)** Notice of the intended operation must be given to the public by some effective means, such as daily newspapers, radio, television, or door-to-door notice.
  - **(3)** A plan for each complete operation must be submitted to, and approved by appropriate personnel of the FAA Flight Standards District Office having jurisdiction over the area where the operation is to be conducted. The plan must include consideration of obstructions to flight; the emergency landing capabilities of the aircraft to be used; and any necessary coordination with air traffic control.



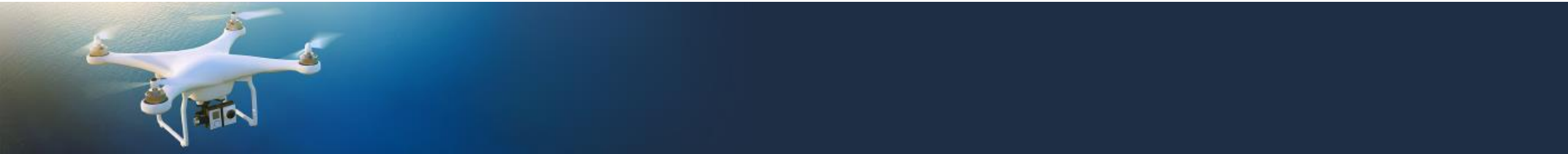
Why Certify a UAS – Commercial On-Demand Package Delivery

- Large Scale Commercial Package Delivery will need to be conducted:
  - Autonomously or with one pilot supervising multiple aircraft
  - Beyond visual line of sight
  - Be able to fly in congested areas
  - Over people
  - Over pets
  - Over highways and active roadways
  - Over people
  - Be able to sense and avoid airborne traffic
  - Be able to sense and avoid ground obstacles while making the delivery
- The solution to these problems will require some form of certified aircraft



Certification and Risk Management

- Current UAS Rules are aimed at promoting safe UAS operations for users of the NAS and people and property on the ground
- FAA Strategy is, to the extent possible, mitigate risks through limitations on operations (speed, weight, altitude, etc.) and education of operators first
- Place limitations on design (such as requiring airworthiness certification) as a last resort
- Concerns about stifling innovation or limiting fast iterations of new technology

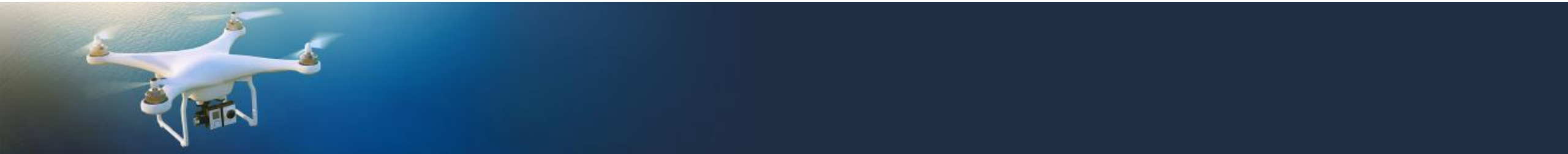


Military Aircraft Can Do These Things, Why Can't We Do Them, Too?

- Existing designs
  - May not meet FAA safety expectations
  - Requirements change for mission and operating area
  - DOD designs vs. design for reliable repeatable civil use
- Operators
  - Prefer to purchase existing designs
  - Seeking operational credit from DOD use
- DoD classifications don't meet FAA needs

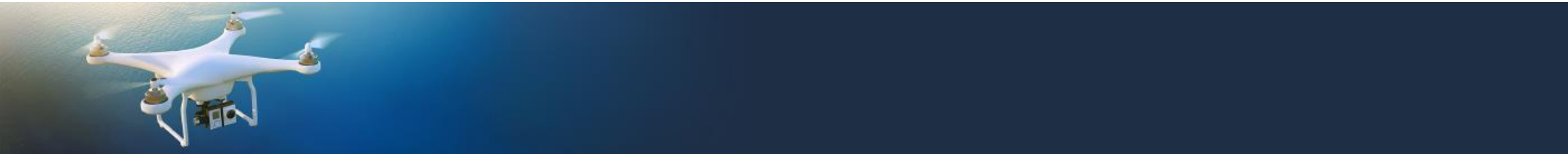
Partnership For Safety Plans

- It is a written agreement that sets out the working relationship between an applicant for product certification or approval and the FAA.
- The Applicant and the FAA agree to work to the principles outlined in the PSP.
- PSP agreements will vary depending on the Applicant’s certification experience and/or level of interaction with the FAA.



Project Specific Certification Plan (PSCP)

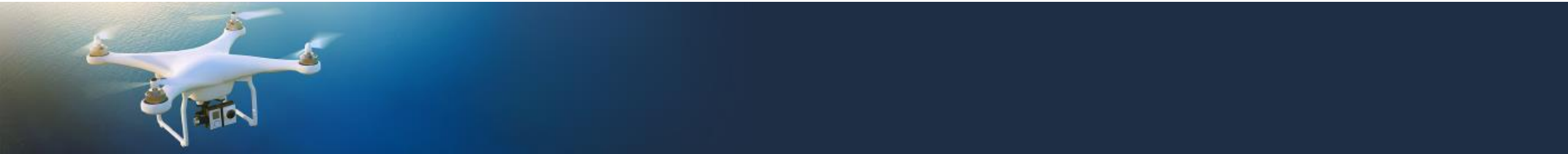
- The PSCP is a key tool in meeting the 14 CFR part 21 requirements for the certification and approval of a product.
- It provides the detail definition of the product and the compliance requirements for successfully completing a specific certification or approval project.
- The PSCP is designed to be used as a project management tool, with gates (pre-defined critical program milestones), performance measures, and information unique to the certification project.
- The PSCP should allow you to manage a project in the manner most efficient within their company.



Project Specific Certification Plan (PSCP)

- At the time of application, the extent and depth of the information in the certification plan should be sufficient to determine the feasibility of the applicant's proposed schedule.
- When the certification plan does not give the FAA assurance to the applicant's understanding of the scope and magnitude of the certification project, the FAA should reject the application and consider the need for another familiarization briefing.

1) General information including applicant identification, application date, model designation, and so forth.
2) A description of the proposed design or design change including sketches and schematics.
3) The intended regulatory operating environment (for example, 14 CFR parts 91, 121, and 137). This should identify the kinds of operations for which the product will be used, and the kind of program under which the product will be maintained.
4) The proposed certification basis including applicable regulation paragraphs and subparagraphs with amendment levels, exemptions, ELOS findings, and special conditions.

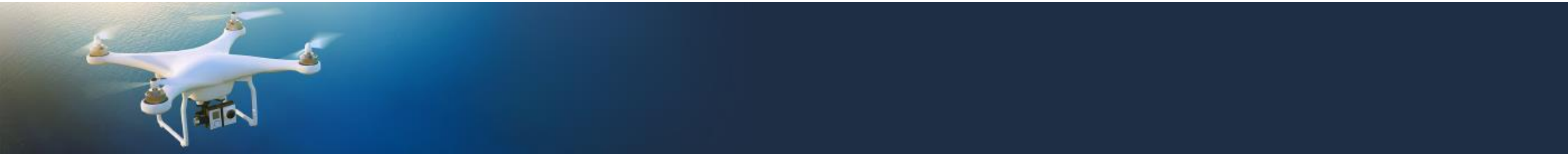


Project Specific Certification Plan (PSCP)

5) A description of how compliance will be shown (ground test, flight test, analysis, similarity, or other acceptable means of compliance). The description of the means of compliance should be sufficient to determine that all necessary FAA data will be collected and all findings can be made.

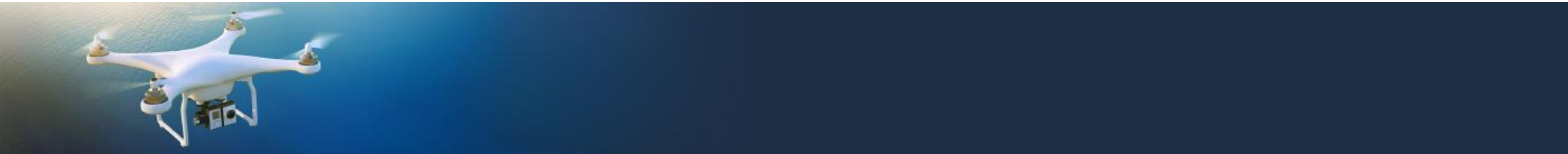
6) A list of documentation that will be submitted to show compliance with the applicable certification basis, and how the applicant will ensure that all showings have been made. This can be accomplished using a compliance checklist addressing each section of the regulations applicable to the product.

7) A list of test articles to be used to generate compliance data. Identify any features or attributes for which special instructions to the manufacturing inspector will be necessary to ensure the test article meets the requirements of its tests (for example, dimensions at one or the other end of a tolerance band).



Project Specific Certification Plan (PSCP)

8) A description of how the continued operational safety requirements will be met after the TC is issued.
9) A project schedule including major milestones, such as preliminary hazard analysis submittal dates, substantiating data submittal dates, conformity and testing completion dates, and expected date of final certification.
10) Identification of all DERs intended for use in the certification project, their areas of authority, and whether they will be approving data or recommending approval of data.
11) Identification of all designated manufacturing inspection representatives (DMIR), designated airworthiness representatives (DAR), and organizational designated airworthiness representatives (ODAR) intended for use, their authorized function codes, and their proposed inspection activities.



Tailored UAS TC Process