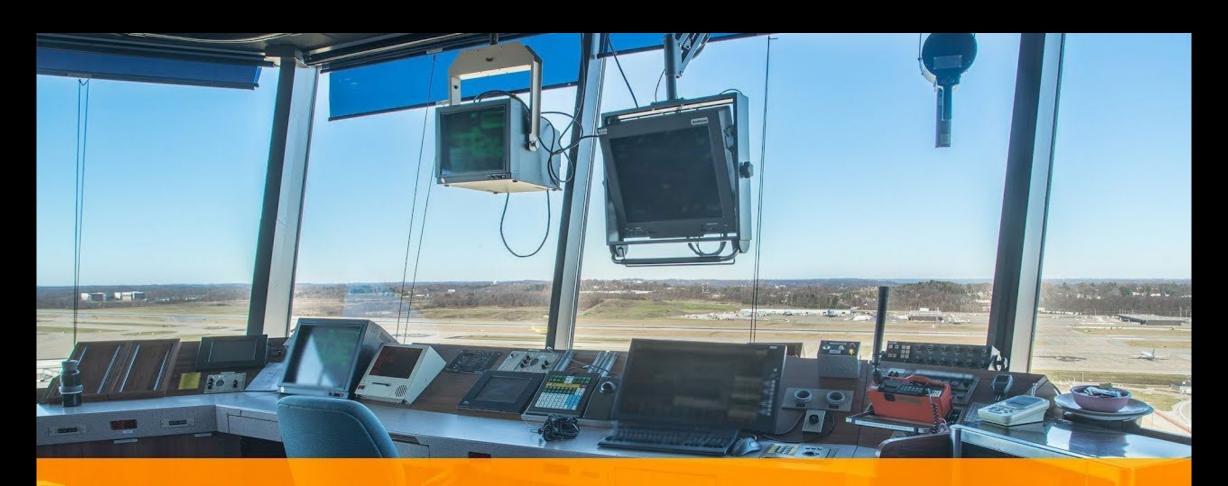
Intro to Small Unmanned Aircraft Systems & Recreational Drones





FAA AIRSPACE WAIVERS AND AUTHORIZATIONS

What is the difference between an Authorization and a Waiver?

The terminology can be confusing because they are sometimes used interchangeably, but they are two separate things.



- An Authorization is associated with controlled airspace, and
- A Waiver is associated with operations

Waiver/Authorization

A Waiver Authorization is twofold. It's a request to deviate from the Operational Rules in a Controlled Airspace.



Waivers & Authorizations

- 1) Log into your account on **FAA DroneZone**
- 2) Input make/model information for your drone
- 3) Select "Operational Waiver" or "Part 107 Waiver/Authorization"





LAANC "Further Coordination"

- LAANC is normally used to request authorization for operations under 400 feet in controlled airspace around airports (available to Part 107 Pilots and Recreational Flyers).
- Part 107 pilots can submit a "further coordination request" if you need to fly above the designated altitude ceiling in a UAS Facility Map, up to 400 feet.
- You can apply up to 90 days in advance of a flight and the approval is coordinated manually through the FAA. There's a 72-hour minimum leadtime for requests.
- <u>Facilities can provide additional guidance for denied Further</u> <u>Coordination requests</u>, allowing drone pilots to adjust operations and resubmit their request.

Effective August 2024

Airspace Waiver/Authorization

Operation in airspace beyond that granted by LAANC - § 107.41

A Waiver/Authorization is required for approval to fly in any controlled airspace that cannot be authorized using the online LAANC system or "further coordination".

- Operation at higher-than-normally approved altitude in controlled airspace
- Operation in normally restricted airspace

Airspace Waiver/Authorization

§ 107.41 - Operation in airspace beyond that granted by LAANC is required to fly higher than the normal altitude limits in Class B, C or D airspace; or to fly in Class E airspace.



Part 107
Operational
Waivers

You <u>do not</u> need a waiver to fly a drone when following Part 107 rules.

You do need a waiver when you want to operate a drone contrary to the rules in Part 107 under the waivable operations options.

Part 107
Operational
Waivers

A waiver is an official document issued by the FAA which approves certain operations of aircraft outside the limitations of a regulation. You may request to fly specific drone operations not allowed under Part 107 by requesting an operational waiver. These waivers allow drone pilots to deviate from certain rules under Part 107 by demonstrating they can still fly safely using alternative methods.

Part 107
Operational
Waivers

You can request **operational** waivers for nine Part 107 Rules

Operational Waivers

A certificate of waiver may authorize a deviation from the following regulations:

- § 107.25 Operation from a moving vehicle
- § 107.29 Operation at twilight or night
- § 107.31 Visual line of sight aircraft operation.
- § 107.33 Visual observer.
- § 107.35 Operation of Multiple Small UAS
- § 107.37 Operation near aircraft; right-of-way rules
- § 107.39 Operation over people.
- § 107.51 Operating limitations for small UAS.
- § 107.145 Operations over moving vehicles

Part 107 – You need an Operational Waiver to.... Fly a small UAS from a moving aircraft or a vehicle in populated areas

§ 107.25 – Operation from a Moving Vehicle or Aircraft

§ 107.25 – Operation from a Moving Vehicle or Aircraft

A waiver is required for operation from a moving vehicle or boat in a populated area.

No person may operate a drone from a moving aircraft; or from a moving land or water-borne vehicle unless the small unmanned aircraft is flown over a sparsely populated area and is not transporting another person's property for compensation or hire.

No waivers are granted for operating a drone from another aircraft.





A pilot may fly a drone from a moving vehicle or boat if the drone is:

- 1) Equipped with a transponder.
- 2) Equipped with visible anti-collision lights.
- 3) Operated over a sparsely-populated area

A pilot may fly a drone from a moving vehicle or boat if the drone is:

- 1) Equipped with a transponder.
- 2) Equipped with visible anti-collision lights.
- 3) Operated over a sparsely-populated area

Part 107 – You need an Operational Waiver to....

Fly a small UAS at night without anti-collision lighting

§ 107.29(a)(2) – Operation at night

Fly a small UAS during periods of civil twilight without anti-collision lighting

§ 107.29(b) – Operation at Night

§ 107.29 – Operation at Night

The small unmanned aircraft operated at night or during periods of civil twilight must have anti-collision lighting visible for at least 3 statute miles with a flash rate sufficient

to avoid a collision.

Note: The onboard colored status/directional drone lights are usually NOT suitable anticollision lights.



Part 107 – You need an Operational Waiver to.... Use a visual observer without following all visual observer requirements

§ 107.33 – Visual Observer

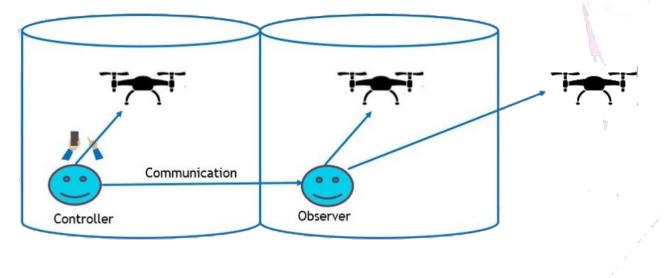
§ 107.33 Visual observer

If a visual observer is used during the aircraft operation, all of the following requirements must be met:

- a) The remote pilot in command, the person manipulating the flight controls of the small unmanned aircraft system, and the visual observer must **maintain effective communication** with each other at all times.
- b) The remote pilot in command must ensure that the visual observer is able to see the unmanned aircraft. (Glasses & contacts are allowed.)
- c) The remote pilot in command, the person manipulating the flight controls of the small unmanned aircraft system, and the visual observer must coordinate to do the following:
 - 1) Scan the airspace where the small unmanned aircraft is operating for any potential collision hazard; and
 - 2) Maintain **awareness of the position** of the small unmanned aircraft through direct visual observation.

§ 107.33 - Visual Observer (VO)

You need a waiver if your operation requires the use of multiple Visual Observers, not all of which will be able to maintain visual line of sight with your drone at the same time. An example of operations where this may apply is when using a daisy-chain of Visual Observers to maintain direct visual contact with the drone throughout the entire flight.

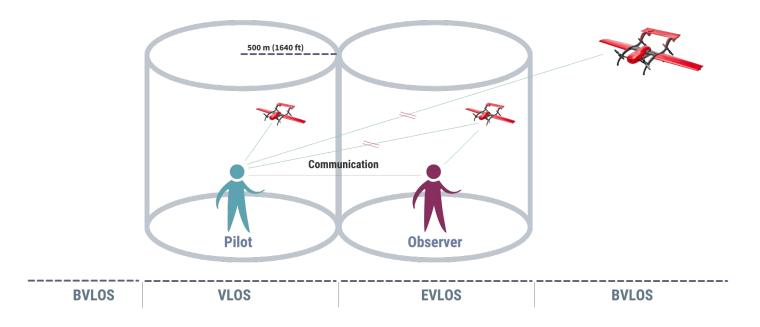


Part 107 – You need an Operational Waiver to.... Fly a small UAS beyond your ability to clearly determine the position, altitude, attitude, and movement of the sUAS, with unaided vision.

§ 107.31 – Visual Line of Sight Aircraft Operation

§ 107.31 - Visual Line of Sight aircraft operation:

A waiver is required for **Beyond Visual Line of Sight (BVLOS)**.



No waiver will be issued to allow the carriage of property of another by aircraft for compensation or hire.

Part 107 – You need an Operational Waiver to....

Fly multiple small UAS with only one remote pilot

§ 107.35 – Operation of Multiple Small UAS

§ 107.35 – Operation of Multiple Small UAS

A person may not operate more than one unmanned aircraft at the same time. This includes:

- 1) The person manipulating flight controls or;
- 2) The remote pilot in command or;
- 3) A visual observer.

All drone swarm operations require a waiver.



Part 107 – You need an Operational Waiver to....

- (a) Small UAS must yield the right of way to all aircraft. Yielding the right of way means that the small UAS must give way to the aircraft and not pass over, under or ahead of it unless well clear.
- (b) No person may operate a small unmanned aircraft so close to another aircraft as to create a collision hazard.

§ 107.37 - Operation near aircraft; right-of-way rules.

During a flight of your small UAS, you observe a hot air balloon entering the area. You should:

- A) yield the right-of-way to the hot air balloon.
- B) ensure the sUAS passes below, above or ahead of the balloon.
- C) expect the hot air balloon to climb above your altitude.

During a flight of your small UAS, you observe a hot air balloon entering the area. You should:

- A) yield the right-of-way to the hot air balloon.
- B) ensure the sUAS passes below, above or ahead of the balloon.
- C) expect the hot air balloon to climb above your altitude.

Part 107 – You need an Operational Waiver to....

Fly a small UAS:

- Over 100 miles per hour groundspeed
- Over 400 feet above ground level (AGL)
- With less than 3 statute miles of visibility
- Within 500 feet vertically or 2000 feet horizontally from clouds

§ 107.51 – Operating limitations for Small Unmanned Aircraft

§ 107.51 – Operating limitations for Small Unmanned Aircraft

Operating limitations for small unmanned aircraft.

A waiver is required to deviate from the following:

- The minimum flight visibility, as observed from the location of the control station must be no less than 3 statute miles.
- The <u>minimum distance from clouds</u> for small unmanned aircraft must be no less than:
 - 1) 500 feet below the cloud; and
 - 2) 2,000 feet horizontally from the cloud.

§ 107.51 – Operating limitations for Small Unmanned Aircraft

A waiver is required to deviate from the following:

- The groundspeed of the small unmanned aircraft may not exceed 87 knots (100 miles per hour).
- The altitude of the small unmanned aircraft cannot be higher than 400 feet above ground level, unless the small unmanned aircraft:
 - (1) Is flown within a 400-foot radius of a structure; and
 - (2) Does not fly higher than 400 feet above the structure's immediate uppermost limit.

Note: Recreational flyers are not permitted to exceed the 400-foot limit in any circumstances.

The maximum speed a drone may fly without a waiver is:

- 1) 100 knots
- 2) 87 MPH
- 3) 100 MPH
- 4) Drones cannot fly very fast; there's no speed limit.

The maximum speed a drone may fly without a waiver is:

- 1) 100 knots
- 2) 87 MPH
- 3) 100 MPH (87 knots)
- 4) Drones cannot fly very fast; there's no speed limit.

You've been hired to survey the water tower at the corner of Hudson & Greenhill Roads. It's 250 feet AGL.

- a) I can fly 650 feet AGL 400 feet over the water tower.
- b) I can fly 400 feet AGL, only 150 feet over the water tower.
- c) I need LAANC authorization and can fly 650 feet over the water tower.
- d) I need LAANC authorization and can only fly 400 feet AGL

You've been hired to survey the water tower at the corner of Hudson & Greenhill Roads. It's 250 feet AGL.

- a) I can fly 650 feet AGL 400 feet over the water tower.
- b) I can fly 400 feet AGL, only 150 feet over the water tower.
- c) I need LAANC authorization and can fly 650 feet over the water tower.
- d) I need LAANC authorization and can only fly 400 feet AGL

"LAANC altitude limits are absolute values above ground level which shall not be added to the height of any structures."

You are trying to inspect a structure that is 1500 feet tall in Class G airspace, but a layer of Class C airspace starts at 1200 feet AGL. How do you do the inspection?

- A) I'm a Part 107 pilot, so I can fly 400 feet over a tower.
- B) I need a Waiver to fly into Class C airspace.
- C) The inspection will only take 15 minutes, so I will use a Visual Observer (VO) and do it when no aircraft are in the vicinity.



Sample Test Question

You are trying to inspect a structure that is 1500 feet tall in Class G airspace, but a layer of Class C airspace starts at 1200 feet AGL. How do you do the inspection?

- A) I'm a Part 107 pilot, so I can fly 400 feet over a tower.
- B) I need a Waiver to fly into Class C airspace.
- C) The inspection will only take 15 minutes, so I will use a Visual Observer (VO) and do it when no aircraft are in the vicinity.

You need approval or a waiver to fly above obstacles in Class B, C, or D controlled airspace. LAANC can only approve up to 400 feet AGL.

Part 107 – You need an Operational Waiver to.... Fly over a person or moving vehicle with a small UAS which does not meet conditions of operational categories 1, 2, 3 or 4

§ 107.39 – Operation over human beings

§ 107.145 - Operations over moving vehicles

Operations over people are prohibited except for:

- Any persons <u>directly participating in the operation</u> of the small unmanned aircraft;
- Any people located under a <u>covered structure</u> or inside a <u>stationary</u> vehicle that can provide reasonable protection from a falling drone;

Or the aircraft meets certain requirements....

There are four drone categories for Operations over People (OOP) –

Category 1, 2, 3 & 4

- All categories must have active Remote ID, and
- Categories 1 thru 3 must not contain any exposed rotating parts that would lacerate human skin upon impact with a human being (i.e., propeller guards).



Category 1 –

- 1) The Drone weighs 0.55 pounds (250 grams) or less on takeoff; and
- 2) Has Remote ID and propeller guards.



Category 2 –

- Drone has an FAA-accepted declaration of compliance (DOC) and is certified by manufacturer to have kinetic energy upon impact of less than 11 foot-pounds / 15 joules; and
- 2) Has Remote ID and propeller guards; and
- 3) Does not have safety defects; and
- 4) Weighs less than 55 pounds.

Category 3 –

- Drone has an FAA-accepted declaration of compliance (DOC) and is certified by manufacturer to have kinetic energy upon impact of less than 25 foot-pounds / 34 joules; and
- 2) Has Remote ID and propeller guards; and
- 3) Does not have safety defects; and
- 4) Weighs less than 55 pounds.

In Addition –

Category 1 & 2 may fly "sustained flight" over open-air assemblies of people.

Category 3 may fly within or over a closed- or restricted-access site and all people located within site must be on notice that a small unmanned aircraft may fly over them



Category 4 –

- 1) Must have an airworthiness certificate under Part 21 and be approved for flights over people.
- 2) Be operated in accordance with the operating limitations specified in the approved Flight Manual or as otherwise specified by the Administrator.
- 3) Have maintenance, preventive maintenance, alterations or inspections performed as prescribed in this section



Operations over Moving Vehicles

For an operation under Category 1, 2 or 3, the small unmanned aircraft, throughout the operation –

- Must remain within or over a closed- or restricted-access site, and all human beings located inside a moving vehicle in the site must be on notice that a small unmanned aircraft may fly over them; or
- 2) Must not maintain sustained flight over moving vehicles.

Definitions Operations Over Human Beings: What does "over" mean?

"Over" refers to the flight of the small unmanned aircraft directly over any part of a person. A flight where a small UAS flies over any part of any person, regardless of how long the flight is over the person, would be considered an operation over people.



A small UAS that hovers directly over a person's head, shoulders, or extended arms or legs would be an operation over people. Similarly, if a person is lying down at a beach, an operation over that person's torso or toes would also constitute an operation over people.

Definitions Operations Over Human Beings (Open-Air Assemblies): What does "sustained flight" mean?

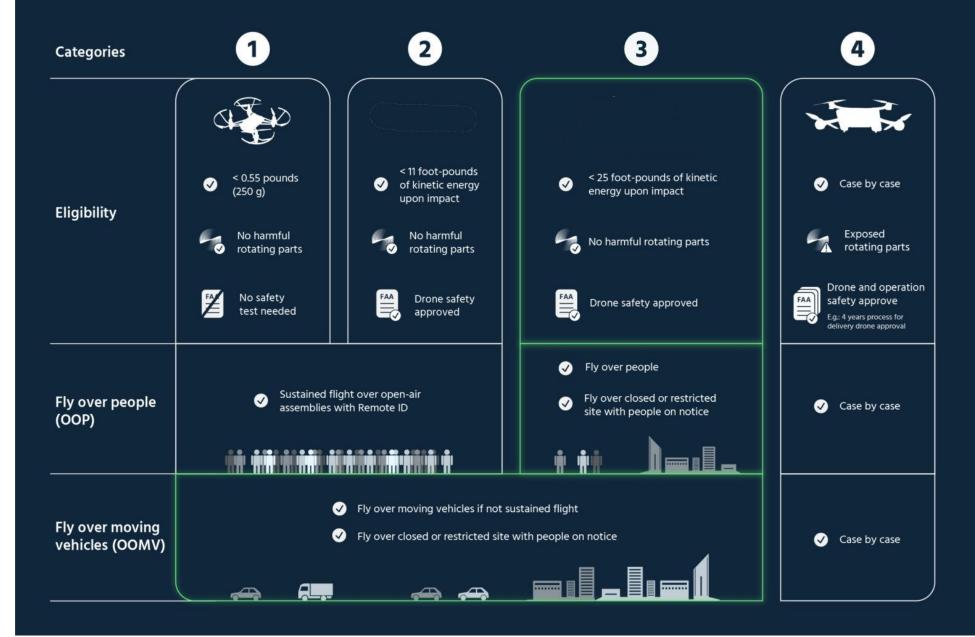
"Sustained flight" over an open-air assembly includes hovering above the heads of persons gathered in an open-air assembly, flying back and forth over an open-air assembly, or circling above the assembly in such a way that the small unmanned aircraft remains above some part the assembly.

Sustained flight over an open-air assembly of people does not include a **brief**, **one-time transiting** over a portion of the assembled gathering, where the flight is <u>unrelated to the assembly</u>.

Definitions Operations Over Human Beings: What is an "open-air assembly?"

There is no specific definition of "open-air assembly". The FAA uses a case-by-case approach in determining how to apply the term. Examples of open-air assemblies may include sporting events, concerts, parades, protests, political rallies, community festivals or parks and beaches during organized events. Some examples that might not be considered open-air assemblies include individuals exiting a shopping center, athletes participating in friendly sports in an open area without spectators, people relaxing in a park or on a beach, or individuals walking or riding on a bike path.

U.S. drone regulations





Section 107.19 (c) Flying Over People

The remote pilot in command must ensure that the small unmanned aircraft will pose **no** undue hazard to other people, other aircraft, or other property in the event of a loss of control of the small unmanned aircraft for any reason.



Sample Test Question

Which category of unmanned aircraft must have an airworthiness certificate issued by the FAA?

- 1) Category 1
- 2) Category 2
- 3) Category 3
- 4) Category 4

		UNITED STATES OF AMERICA PARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION SPECIAL AIRWORTHINESS CERTIFICATE			
Α	CATEGORY/DESIGNATION Special Flight Permit				
	PURPOSE	Production Flight Testing or Customer Demonstration			
В	MANU-	NAME The Boeing Company			
	FACTURER	ADDRESS P.O. Box 767, Renton WA 13567			
_	FLIGHT	FROM N/A			
С		TO N/A			
_	N- N/A	SERIAL NO. N/A			
D	BUILDER	N/A MODEL N/A			
	DATE OF ISS	UANCE 01/31/2001 EXPIRY 01/31/2001			
	OPERATING LIMITATIONS DATED 01/31/2001 ARE PART OF THIS CERTIFICATE				
E	Sam T. Smith	DESIGNATION OR OFFICE NO. NM-XX			

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		UNITED STATES OF AMER PARTMENT OF TRANSPORTATION - FEDERAL A SPECIAL AIRWORTHINESS	AVIATION ADMINISTRATION		
Α	CATEGORY/DESIGNATION Special Flight Permit				
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_	MANU- NAME The Boeing Company				
В	FACTURER	ADDRESS P.O. Box 767, Renton WA 13567			
_	FLIGHT	FROM N/A			
С		TO N/A			
_	N- N/A		SERIAL NO. N/A		
D	BUILDER N/A		MODEL N/A		
	DATE OF ISSUANCE 01/31/2001		EXPIRY 01/31/2001		
E	OPERATING LIMITATIONS DATED 01/31/2001 ARE PART OF THIS CERTIFICATE				
	SIGNATURE OF FAA REPRESENTATIVE Sam T. Smith Sam T. Smith		DESIGNATION OR OFFICE NO. NM-XX		

Airworthiness

The remote pilot-in-command is responsible for the determination of airworthiness before flight and discontinuing the flight when they know or has reason to know that the small unmanned aircraft system is no longer in a condition for safe operation.

Two main factors determine if an aircraft is airworthy:

- The aircraft conforms to its type certificate and authorized modifications; and
- The aircraft must be in condition for safe operation

Waiver Requests

- •Submit your application, including all supporting documents and attachments, through your FAA DroneZone account. Select the "Operational Waiver" option.
- •The FAA will do their best to review and approve or disapprove waiver requests within **90 days** of submission. Processing times will vary based on the complexity of your request and the completeness of your initial application.

	Beyond Visual Line of Sight (107.31) Waiver Trend Analysis					
Waiver Application Elements	Command and Control (C2) Link and Emitters Performance Capabilities	Detect-and-Avoid (DAA) Methods	Weather Tracking and Operational Limitations	Training Requirements for Pilots and Other Participating Persons		
Sufficient Information Characteristics of the Beyond Visual Line of Sight (BVLOS) applications approved after requests for additional information	-States and demonstrates max range and envelope that C2 can operate in, taking into account geographic area, environment, and terrain -Provides a complete description of each emitter, including the Federal Communications Commission (FCC) grant of authorization and FCC ID number for each transmitter/emitter on the sUA and ground control station	-Detailed descriptions and procedures for risk mitigations to avoid collisions with aircraft (ex. Visual Observers, and technology)	-Details when weather reports will be gathered, what will be gathered, and where they will be taken fromStates weather limitations, such as small unmanned aircraft system (sUAS) manufacturer's limitations or wind speed	-Details and provides means for validating effectiveness of employee training and testing program. Example: -Lists out courses/subjects covered -Tests corrected to 100% and stored for easy retrieval later		
Insufficient Information Characteristics of the Beyond Visual Line of Sight (BVLOS) applications after requests for additional information	-C2 operational capabilities not evident -Not demonstrating C2 can operate at stated max range or stating the envelope. i.e. lacking data -Application did not include FCC grant of authorization or FCC identification number for each emitter on the small unmanned aircraft system (sUAs) and ground control station	-Detailed methods or procedures to see and avoid or detect and avoid participating or non-participating aircraft and non-participating persons/moving vehicles are not evident or adequately described Examples: -If used, a video feed alone may not be sufficient, because detection would be limited to the direction the camera is pointing (i.e. not 360 degree detection) and does not address avoidanceIf used, Automatic dependent surveillance - broadcast (ADS-B) In alone may not be sufficient because ADS-B In only provides data for cooperative traffic and does not address avoidance.	-Providing general, or no statements Examples: -'We only fly on clear days' -'Weather is to be of Visual Flight Rules in nature' - Multiple applications not addressing weather requirements	-Provision of a method of assuring all required persons participating in operation have knowledge in all aspects of BVLOS not evident -Not stating who will have the training, what the training will consist of, or a method of assuring all required persons have been successfully trained		

