U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

April 17, 2015

Exemption No. 11353
Regulatory Docket No. FAA–2014-1105

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Dear Mr. Ellett and Mr. Rizzi:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

The Basis for Our Decision

By letter dated December 23, 2014, you petitioned the Federal Aviation Administration (FAA) on behalf of Union Pacific Railroad (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct assessments circumstances following an incident that involves Union Pacific property and/or personnel and for training flights.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

Airworthiness Certification

The UAS proposed by the petitioner is an AirCover QR-425s.

In accordance with the statutory criteria provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for aerial data collection. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, Union Pacific Railroad is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to

the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Union Pacific Railroad is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the AirCover QR-425s when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

2. Operations for the purpose of closed-set motion picture and television filming are not permitted.

3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.

4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.

5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.

6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the

Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS−80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g., replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.

12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.

19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.

21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N−Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

24. The UA must remain clear and give way to all manned aviation operations and activities at all times.

25. The UAS may not be operated by the PIC from any moving device or vehicle.

26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

    The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS−80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.

30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
    a. Dates and times for all flights;
    b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
    c. Name and phone number of the person responsible for the on-scene operation of the UAS;
    d. Make, model, and serial or N−Number of UAS to be used;
    e. Name and certificate number of UAS PICs involved in the aerial filming;
    f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
    g. Signature of exemption holder or representative; and
    h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.

31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on April 30, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/
John S. Duncan
Director, Flight Standards Service

BEFORE THE
FEDERAL AVIATION ADMINISTRATION

UNION PACIFIC RAILROAD, Petitioner.	Docket No. FAA-2014-_____

PETITION OF UNION PACIFIC RAILROAD
FOR AN EXEMPTION FROM CERTAIN FEDERAL AVIATION REGULATIONS
TO PERMIT UNMANNED AIRCRAFT SYSTEMS (UAS) OPERATIONS

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DATE: December 23, 2014

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1. BACKGROUND INFORMATION: THE PETITIONER

Union Pacific Railroad ("UP") is the principal operating company of Union Pacific Corporation, which is one of the United States' leading transportation companies. UP is North America's premier railroad franchise, with operations covering 23 states across the western two-thirds of the United States.

On occasion, UP railroad operations are involved in unplanned incidents that require assessment and the creation of a response plan by UP to ensure the safety of the public, first responders, and our employees. For the purpose of this Petition, an incident is an occurrence associated with the operation of a railroad that affects, or could affect, the safety of operations, or results in, or could result in, death, serious bodily injury or significant property damage. Such incidents may include actual or suspected derailments, hazardous materials ("hazmat") releases or other circumstances that might pose a threat to the safety, security, or well-being of the public, first responders, UP employees, private or public property, or the environment. When such an incident occurs, a quick and accurate assessment of the nature and scope of hazards can be a matter of life and death. An exemption allowing UP to utilize a UAS for such assessments could save lives.

2. PROPOSED UAS OPERATIONS: THE EXEMPTION REQUEST

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("FMRA") and 14 C.F.R. ("FAR") §§ 11.61(b), 11.63(a), and 11.81, UP requests that the FAA grant to UP an exemption from certain sections of the FAR (detailed below) to permit UP to operate one or more small UAS (up to two simultaneously, but with separate flight crews) for the purpose of conducting assessments when UP railroad engines, cars, tracks or other property are, or may be, involved in an incident ("Incident Assessment", and the corresponding UAS flight, "Incident Assessment Flight"), as well as for training, proficiency, and experience-building flights to ensure that the UAS crew is qualified and current for the Incident Assessment Flights ("Training Flights"). Incident Assessments

would involve generating still or video photography of the incident site, air samples, and similar data in order to identify and evaluate suspected and actual conditions, threats, the status of incident sites, and response options. UP plans to conduct these Incident Assessment Flights for assessing actual or suspected derailments, hazmat releases or other circumstances that might pose a threat to the public, first responders, UP employees, private or public property, or the environment. The purpose of such Incident Assessment Flights will be to determine how best to respond to each incident in the safest and most effective manner. For instance, the data gathered in connection with Incident Assessment Flights could help UP and local authorities identify areas that need to be evacuated in light of a hazmat release, or prevent first responders from entering a hazardous area without proper equipment. As explained below, UP's proposed small UAS operations, as conditioned and limited herein, will not adversely affect safety, but rather will provide a level of safety equal to or greater than that provided by the current rules and large manned aircraft operations. See FAR § 11.81.

3. PROPOSED CONDITIONS AND LIMITATIONS

The small UAS operations proposed in this Petition will be subject to the following conditions and limitations. Each of these conditions and limitations is consistent with previously granted small UAS Section 333 exemptions and FAA guidance. See, e.g., Exemption No. 11110 (December 10, 2014; Docket FAA-2014-0367) ("Trimble Exemption"); Exemption No. 11109 (December 10, 2014; Docket FAA-2014-0507) ("Clayco Exemption"); Exemption No. 11062 (September 25, 2014; Docket FAA-2014-0352) ("Astraeus Exemption").

3.1 Conditions and limitations regarding the proposed UAS

UP intends to operate the AirCover QR-425s UAS ("the AirCover UAS") under the exemption. The AirCover UAS is a battery-powered, quad-rotor system, which uses 10-inch fixed-pitch or 12-inch polymer propellers. The developmental and operational history of the AirCover UAS

extends to 2008 with unit one, first generation. That UAS is currently operational and has over 9,000 cycles without an incident. The QR-425 registered with AirCover has been flown without incident exceeding 980 hours and 115 cycles. No customer-registered QR-425s flown under COAs have reported any incidents. The QR-425 has been reviewed under DHS / RAPS Certification with FAA representatives in Oklahoma City for certification in February 2014. The QR-425 has been flying for over four years without any reported incidents. The FAA has on file a QR-425 Experimental Airworthiness Certification (pending) with an incident-free range in Northern California since 2012. Each AirCover UAS used in operations under the exemption will be subject to the following conditions and limitations:

3.1.1 Operations under the exemption will be limited to the AirCover UAS. The free flying unmanned aircraft portion of the UAS ("the UA") will have a gross weight of not more than 7 pounds, including energy sources and equipment. [Trimble Exemption Limitation No. 1]

3.1.2 The UA has maximum dimensions of approximately 28 inches x 28 inches x 11 inches.

3.1.3 The UA will have a maximum cruise speed of 28 knots and will not be flown at an indicated airspeed in excess of 28 knots. [Trimble Exemption Limitation No. 2]

3.1.4 The UA will have a maximum operating time of 30 minutes.

3.1.5 The UA will be identified by serial number, and registered with the FAA in accordance with FAR Part 47. [Trimble Exemption Limitation No. 21]

3.1.6 The UA will have identification markings in accordance with FAR Part 45, with the markings being as large as practicable. [Trimble Exemption Limitation No. 21]

3.2 Conditions and limitations regarding the proposed UAS operations

All UAS operations under the exemption will be subject to the following conditions and limitations:

3.2.1 All UAS operations will be covered by an Air Traffic Organization ("ATO")-issued Certificate of Waiver or Authorization ("COA"), and the COA will require that UP request a Notice to Airman ("NOTAM") before each UAS operation. UP will request a NOTAM not more than 72 hours in advance of, but not less than 48 hours prior to, each Training Flight. [Trimble Exemption Limitation No. 20] UP will request a NOTAM as far in advance as reasonably practical, but not more than 72 hours, prior to each Incident Assessment Flight.

3.2.2 The UA will not operate in Class B, C or D airspace without written approval from the FAA [Astraeus Exemption Limitation No. 34] and a Mode C transponder with VHF radio communications. The UA will operate only in Class G airspace. [Trimble Exemption Limitation No. 27]

3.2.3 The UA will not operate within 5 nautical miles of the geographic center of a non-towered airport as denoted on a current FAA-published aeronautical chart unless a letter agreement with the airport's management is obtained, and, if time reasonably permits, a corresponding NOTAM is issued. UP will make this letter agreement available to the FAA upon request. [Astraeus Exemption Limitation No. 34]

3.2.4 Prior to UAS operations, the radio frequency spectrum used for operation and control of the UA (900 MHz and 2.4 GHz) will comply

with Federal Communications Commission (FCC) or other appropriate government oversight agency requirements. [Trimble Exemption Limitation No. 22]

3.2.5 The minimum crew for each UAS operation will consist of one Pilot in Command ("PIC") and one Visual Observer ("VO"). The PIC will be designated before the flight and cannot transfer his/her designation for the duration of the flight. The PIC must ensure that the VO can perform the functions prescribed for the VO in the Manuals (defined in Section 3.4 below). [Trimble Exemption Limitations Nos. 4 and 5]

3.2.6 Each UAS operation under the exemption will be planned to operate for a period no longer than 10 minutes less than the maximum flight time of the UAS under the conditions (speed, altitude, etc.) of the planned UAS operations. The PIC is prohibited from beginning a UAS flight unless (considering wind and forecast weather conditions) there is enough power to fly to the first point of intended landing and, assuming normal cruising speed, to fly after that for at least 10 minutes. [Trimble Exemption Limitation No. 19]

3.2.7 Each UA will remain at least 3 nautical miles from any public towered airport to the extent possible.

3.2.8 Prior to each UAS operation in which the UA will operate within 3 nautical miles of a public towered airport, the PIC will ensure that the FAA Air Traffic Control officials with responsibility for that airport are notified in advance of the UAS operation.

3.2.9 Prior to each Incident Assessment Flight, UP will orally notify the local Flight Standards District Office ("FSDO") with jurisdiction over the

proposed UA flight about the flight and, to the extent reasonably possible, will request urgent issuance of a NOTAM about such operation. Prior to each Training Flight, UP will notify the local FSDO with jurisdiction over the proposed UA flight about the flight and will request timely issuance of a NOTAM about such operation.

3.2.10 Prior to each UAS operation, each member of the crew who will be conducting that UAS operation will participate in a safety briefing about the UAS operation.

3.2.11 Prior to each UAS operation, the PIC will inspect the UAS (including the Ground Control Station) to ensure it is in a condition for safe flight. If the inspection reveals a condition that affects the safe operation of the UAS, the UAS is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight. [Trimble Exemption Limitation No. 7]

3.2.12 Prior to each UAS operation, the PIC will review the weather, the UAS battery requirements, the UA takeoff and landing distances, and the UAS performance, and will account for all relevant site-specific conditions.

3.2.13 All maintenance and alterations will be properly documented in the UAS records. [Trimble Exemption Limitation No. 7] UP's AirCover UAS maintenance personnel will make a record entry in the UAS logbook or equivalent document of the corrective action taken against discrepancies discovered between inspections. [Trimble Exemption Limitation No. 14]

3.2.14 Prior to each takeoff of the UA, the altitude reading of the altimeter will be zeroed, such that the altitude of the UA at the point of takeoff will be set to zero as a basis for that UAS operation, and the PIC will confirm the accuracy of the altitude reading. [Astraeus Exemption, at 21]

3.2.15 The UA will be operated within visual line of sight ("VLOS") of the PIC at all times. The VLOS will be unaided, except for corrective lenses as set forth on the PIC's FAA-issued airman medical certificate. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. [Trimble Exemption Limitations Nos. 4 and 5]

3.2.16 During each UAS operation, the UA will remain at or below 400 feet above ground level ("AGL"). [Trimble Exemption Limitation No. 3]

3.2.17 To the extent reasonably practical, each UP Incident Assessment Flight will be conducted over UP property or over private or controlled access property with permission or an easement from the land owner/controller or authorized representative. Each Training Flight will be conducted over UP property or over private or controlled access property with permission or an easement from the land owner/controller or authorized representative. [Trimble Exemption Limitation No. 34]

3.2.18 When the circumstances make it reasonably impractical for a UP Incident Assessment Flight to remain over UP property or over private or controlled access property for which UP has obtained permission or an easement to conduct its small UAS operations, UP

will use reasonable efforts in advance of the Incident Assessment Flight to obtain permission from other property owners to operate the AirCover UAS over their property. These circumstances may include, but are not limited to, derailments and hazmat releases that have not been contained within UP property.

3.2.19 During each UAS operation, the PIC and the VO will be able to communicate verbally with each other at all times. [Trimble Exemption Limitation No. 5]

3.2.20 During each UAS operation, the PIC will not operate the UA directly over the location of any person known by the PIC to be present, at an altitude that would be hazardous to the person on the ground in the event of a UAS failure or emergency.

3.2.21 All UAS operations will take place during visual meteorological conditions (VMC) only. [Trimble Exemption Limitation No. 28]

3.2.22 All UAS operations will take place during daylight hours. UAS operations will not be conducted during night, as defined in FAR § 1.1. [Trimble Exemption Limitation No. 26]

3.2.23 During each UAS operation, the UA will avoid, remain clear of, and yield right-of-way to, all manned aerial operations and activities (including, but not limited to, ultralight vehicle, parachute, parasailing, and hang glider activities). [Trimble Exemption Limitation No. 24]

3.2.24 Each UAS operation will maintain a safe distance from any structure or facility that has a national security implication that is known to UP.

3.2.25 During each UAS operation, the UA will be operated not less than 500 feet below, and not less than 2,000 feet horizontally, from a cloud

or when visibility is less than 3 statute miles from the PIC. [Trimble Exemption Limitation No. 28]

3.2.26 The UAS will not be operated by the PIC from a moving device or vehicle. [Trimble Exemption Limitation No. 25]

3.2.27 The PIC will begin terminating each UAS operation when no less than 25% of the battery power remains.

3.2.28 Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics (e.g., replacement of a flight critical component) must undergo a functional test flight in accordance with the Manuals. The PIC who conducts the functional test flight will make an entry about the flight in the UAS records. [Trimble Exemption Limitation No. 8]

3.2.29 For each UAS operation, the UAS will be programmed so that if the UAS loses its communications or GPS signal, the UA will return to a pre-determined location within the UP, private or controlled access property, and land or be recovered in accordance with the Manuals. [Trimble Exemption Limitation No. 17]

3.2.30 During UP Training Flights, the UA will operate at least 500 feet from all non-participating persons, vessels, vehicles, and structures, and will not be operated over congested or densely populated areas. [Trimble Exemption Limitations Nos. 31 and 30]

3.2.31 The PIC will abort the UAS operation and UA flight in accordance with the Manuals if unpredicted obstacles or emergencies arise [Trimble Exemption Limitation No. 18] or the continued UAS

operations pose a threat to other operations in the National Airspace System or persons on the ground.

3.2.32 The documents required by FAR §§ 91.9 and 91.203 will be available to the PIC at the Ground Control Station of the UAS at any time the UA is operating, and will be made available to the FAA or any law enforcement official upon request. [Trimble Exemption Limitation No. 23]

3.2.33 Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA will be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents will be reported to the National Transportation Safety Board ("NTSB") per instructions contained on the NTSB website. [Trimble Exemption Limitation No. 35]

3.3 Conditions and limitations regarding the PIC and other crewmembers - qualifications and training

The PIC and other crewmembers for each UAS operation under the exemption will be subject to the following conditions and limitations:

3.3.1 The PIC will possess at least an FAA private pilot certificate and a third-class airman medical certificate, and will satisfy the flight review requirements of FAR § 61.56 in an aircraft for which the PIC is rated on his/her private pilot certificate.[1] [Trimble Exemption Limitation No. 15]

[1] UP respectfully submits that it is unnecessary for safe small UAS operations to require the PIC to have a private pilot certificate, particularly given the other conditions and limitations proposed in this Petition (e.g., operate over UP, private or controlled access property; operations no higher than 400 feet AGL; VLOS between PIC and AirCover UAS to be maintained at all times; operate in Class G airspace, etc.). Completion of UP's and AirCover's training should

3.3.2 Prior to participating in an Incident Assessment Flight as PIC, the PIC will have accumulated and logged, in a manner consistent with FAR § 61.51(b), a minimum of 20 flight cycles and 16 hours of total time as a UAS pilot.

3.3.3 Prior to participating in an Incident Assessment Flight as PIC, the PIC will have accumulated and logged, in a manner consistent with FAR § 61.51(b), a minimum of 5 flight cycles as a UAS pilot, and 5 takeoffs and 5 landings within the preceding 90 days operating the make and model of UAS to be used for operations under the exemption.

3.3.4 Training Flights may be operated under the exemption to accomplish the required flight cycles, flight time, and takeoffs and landings required to act as PIC of a UAS during an Incident Assessment Flight. During these Training Flights, all persons not essential for flight operations are considered non-participants, and the PIC will operate the UA at an appropriate distance from non-participants as required by FAR § 91.119. [Astraeus Exemption Limitations Nos. 11 and 12]

3.3.5 The PIC and VO will have completed a qualification process established by the UP QR-425 Standard Operating Procedures and the manufacturer's recommendation. [Astraeus Exemption Limitation No. 13]

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be more than sufficient for the safe operation of the AirCover UAS on Initial Assessment Flights. Recognizing that the FAA rejected a request to permit UAS operations without an FAA private pilot certificate in the Trimble Exemption, at 14-15, 23, UP will accept a private pilot certificate requirement for the PIC. However, to the extent the FAA has any flexibility on this point, UP alternatively requests relief from that requirement such that UP's PICs must only complete UP's and AirCover's training as proposed under this exemption (and not have a private pilot certificate).

3.3.6 Before operating any UAS, UP will create a record of the completion of the qualification process by the PIC and VO. This record will be maintained for at least one year after the individual is no longer performing duties associated with UP's UAS operations, and will be made available to the FAA upon request. [Astraeus Exemption Limitation No. 13]

3.4 Conditions and limitations regarding UP manuals related to UAS operations

UP will follow the following documents containing company procedures for the AirCover UAS operations for all UAS operations under the exemption: the AirCover Maintenance Manual ("Maintenance Manual"), the UAS Operations Manuals ("Operations Manual"), and the Standard Operating Procedures (collectively, these three documents are "the Manuals"). The Maintenance Manual and the Operations Manual have been approved by the FAA in the context of public COA operations using the AirCover UAS. A confidential copy of the Manuals will be submitted to the FAA Assistant Chief Counsel for International Law, Legislation, and Regulations as supporting documents for this Petition. The Manuals contain information that is highly proprietary to UP and/or AirCover, and UP therefore requests that the FAA treat the Manuals as confidential and not disclose them to the public. The Manuals will be subject to the following limitations and conditions:

3.4.1 The Manuals and the exemption must be maintained and made available to the FAA upon request. If a discrepancy exists between the conditions and limitations in the exemption and the procedures outlined in the Manuals, the conditions and limitations in the exemption take precedence and must be followed. Otherwise, UP must follow the procedures as outlined in the Manuals. [Trimble Exemption Limitation No. 6]

3.4.2 UP may update or revise its Manuals, and it is UP's responsibility to track such revisions and present updated and revised documents to the FAA upon request. UP must also present updated and revised documents if it petitions for an extension or amendment of the exemption. If UP determines that any update or revision would affect the basis upon which the FAA granted the requested exemption, then UP must petition for an amendment to the exemption. UP will contact the FAA's UAS Integration Office (AFS-80) if questions arise regarding updates or revisions to the Manuals. [Trimble Exemption Limitation No. 6]

3.4.3 The Manuals contain information about the AirCover UAS's performance, limitations, and loading information.

3.4.4 The Manuals contain the procedures for UAS operations, including preflight inspections, which will account for all discrepancies, i.e., inoperable components, items or equipment. [Trimble Exemption Limitation No. 9]

3.4.5 The Manuals contain the requirements and procedures for a functional test flight of the UAS and aircraft record entry. [Trimble Exemption Limitation No. 8]

3.4.6 UP must carry out its maintenance, inspections, and record keeping in accordance with the Manuals. Maintenance, inspection, and alterations must be noted in the aircraft logbook, including total flight hours, a description of the work accomplished, and the signature of the authorized AirCover UAS technician returning the AirCover UAS to service. [Trimble Exemption Limitation No. 11]

3.4.7 The AirCover UAS technicians maintaining and servicing UP's UAS must receive, and document, the training called for in the Manuals. [Trimble Exemption Limitation No. 12]

3.4.8 Each UAS operated under the exemption will comply with all manufacturer System and Safety Bulletins, and that requirement is set forth in the Manuals. [Trimble Exemption Limitation No. 13]

3.4.9 UP will follow the manufacturer's UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements. [Trimble Exemption Limitation No. 10]

3.4.10 The Manuals contain procedures for performing and documenting maintenance, preventive maintenance, alterations, status of replacement/overhaul component parts, and the total time in service of the UAS (and for maintaining the corresponding records).

3.4.11 The requirements in the Manuals will comply with the manufacturer's UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limits, and will at all times conform to the manufacturer's requirements in these areas.

4. REQUEST FOR DETERMINATION UNDER SECTION 333 OF FMRA

In accordance with FMRA Sec. 333, UP requests that the Secretary of Transportation determine that UP's proposed small UAS operations (i) do not create a hazard to users of the National Airspace System or the public, and (ii) do not pose a threat to national security.

UP further requests that, based on the Secretary's determination, the FAA determine – as it did in the Astraeus Exemption and Clayco Exemption – that relief from FAR Part 21, and any

associated noise certification and testing requirements of FAR Part 36, is not necessary for UP's UAS operations as proposed in this Petition.[2]

5. INFORMATION REQUIRED BY 14 CFR § 11.81 TO SUPPORT A PETITION FOR EXEMPTION

As required by FAR § 11.81, UP provides the following information in support of this Petition:

5.1 Contact information:

Name: Union Pacific Railroad submits this Petition for Exemption, through counsel:

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[2] Astraeus Exemption, at 14, 22; Clayco Exemption, at 10, 16. If the FAA concludes that the UAS operations proposed in this Petition require an exemption from FAR Part 21 and/or 36, then UP requests that the FAA include that in the exemption.

5.2 The specific section or sections of the FAR[3] from which exemption is sought:

FAR § 61.113(a) and (b) – Private pilot privileges and limitations: Pilot in command.

FAR § 91.7(a) – Civil aircraft airworthiness.

FAR § 91.119(b) and (c) – Minimum safe altitudes: General.

FAR § 91.121 – Altimeter settings.

FAR § 91.151 – Fuel requirements for flight in VFR conditions.

FAR § 91.405(a) – Maintenance required.

FAR § 91.407(a)(1) – Operation after maintenance, preventive maintenance, rebuilding, and inspections.

FAR § 91.409(a)(1) and (2) – Inspections.

FAR § 91.417(a) and (b) – Maintenance records.

[3] This Petition does not seek exemption from:

-- FAR Part 21 or 36, based on the reasoning in the Astraeus Exemption, at 14, and Clayco Exemption, at 10.

-- FAR § 91.7(b), based on the reasoning in the Trimble Exemption, at 17.

-- FAR §§ 91.9(b)(2) and 91.203(a) and (b), based on the reasoning in the FAA's August 8, 2014 Memorandum titled "Interpretation regarding whether certain required documents may be kept at an unmanned aircraft's control station" ("FAA's August 8, 2014 Memorandum"), the Astraeus Exemption, at 19-20, 22, and the Trimble Exemption, at 17, 20.

-- FAR §§ 45.23(b) and 91.9(c), based on the reasoning in the Astraeus Exemption, at 14, and the Trimble Exemption, at 14, related to FAR § 45.23(b), and assuming that the markings on the UA used to comply with FAR Part 45, Subpart C requirements are as large as practicable.

-- FAR §§ 47.3(b)(2) and 47.31(c), based on the reasoning in the FAA's August 8, 2014 Memorandum, and assuming that all UA are registered in accordance with FAR Part 47.

-- FAR § 91.103(b)(2), based on the reasoning in the Astraeus Exemption, at 20, and the Clayco Exemption, at 14, which concluded that an exemption from the preflight action requirements is not necessary where the grant of an exemption for UAS operations includes conditions that satisfy preflight action requirements. UP proposes such conditions in this Petition.

-- FAR § 91.109, based on the reasoning in the Astraeus Exemption, at 20, and the Clayco Exemption, at 14, which concluded that an exemption from the requirement for dual flight controls for flight or simulator training or for flight testing is not necessary when there is no indication that dual flight controls will be used during any flight or simulator training or flight testing.

If the FAA concludes that the UAS operations proposed in this Petition require an exemption from one or more of these requirements, then UP requests that the FAA include that in the exemption.

5.3 The extent of relief sought and the reason relief is sought:

When the need to conduct an Incident Assessment arises, UP proposes to conduct Incident Assessment Flights using small AirCover UAS, as described above, as a means of gathering the information necessary to determine the most effective and safe means of preventing or responding to the incident and ensuring the safety, security, and well-being of the public, first responders, UP employees, private or public property, or the environment. In addition, UP also seeks the requested relief in order to conduct Training Flights using the small AirCover UAS.

To conduct these Incident Assessment Flights and Training Flights with the small AirCover UAS, UP petitions the FAA, pursuant to FAR §§ 11.61(b), 11.63(a), and 11.81(b), for an exemption from the following FAR for the reasons noted:

FAR § 61.113(a) and (b) – Private pilot privileges and limitations: Pilot in command.

The regulation states, in relevant part:

> (a) Except as provided in paragraphs (b) through (h) of this section, no person who holds a private pilot certificate may act as pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.
>
> (b) A private pilot may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment if:
>
> (1) The flight is only incidental to that business or employment; and
> (2) The aircraft does not carry passengers or property for compensation or hire.
>
> (c) ****.

UP requests an exemption from this regulation to the extent necessary to permit UP to conduct UAS operations using PICs who hold FAA private pilot certificates. While UP understands that the FAA normally requires a PIC to hold a commercial pilot certificate where there is compensation either to the pilot or for the operation, UP requests that the FAA exempt UP and its

PICs from this requirement, since the use of a private pilot as the PIC for the UAS operations under this exemption will be more safe than the use of a commercial pilot for manned aircraft operations. Unlike conventional aircraft, the AirCover UAS is remotely controlled, with no crew or passengers, and battery-powered. The fulfillment of the additional requirements for a private pilot to become qualified as a commercial pilot would not lead to any additional safety benefits when UAS operations are involved.

With respect to *aeronautical knowledge* requirements, the differences between the requirements for private pilots and for commercial pilots are significant in the traditional world of manned aircraft. A pilot who wishes to operate flights that involve the carriage of persons or property for compensation or hire is typically expected to improve his or her aeronautical knowledge with respect to the operation of those larger manned aircraft. For instance, the prospective commercial pilot is expected to be able to operate more complex aircraft and to operate those aircraft in conditions other than VMC. Pilots seeking to become commercial pilots for manned aircraft must acquire additional aeronautical knowledge about the use of performance charts and aeronautical charts, beyond that which a private pilot must obtain regarding navigation under VFR, night operations, and the use of air navigation aids/facilities.[4] However, no aspect of this incremental additional knowledge is significant for the daytime, VMC small UAS operations proposed in this Petition.

With respect to the *aeronautical experience* requirements, the differences between the requirements for private pilots and for commercial pilots are also significant. However, the additional experience required for a commercial pilot certificate is required to a great extent to allow the upgrading pilot to acquire experience of a type that a commercial PIC of a manned aircraft must obtain in order to safely conduct commercial operations in a larger manned aircraft. For instance,

[4] FAR § 61.125, Aeronautical knowledge for commercial pilots, paras. (b)(7) (the use of performance charts), (b)(9) (use of aeronautical charts beyond that necessary for flight under VFR), (b)(10) (use of air navigation aids), and (b)(14) (night and high-altitude operations).

the applicant for a commercial certificate with a single-engine land rating must obtain 50 hours of cross-country flight, 10 hours of instrument training, 10 hours of time in a complex aircraft, 10 hours of solo time, and 5 hours in night VFR conditions.[5] In addition, a great deal of time is required for a pilot of a larger manned aircraft seeking to become a commercial pilot to ensure that the pilot's takeoffs and landings can be conducted safely enough so as not to imperil the passengers and property aboard the manned aircraft. In this regard, there is a fundamental difference between the type of experience that the PIC of a manned aircraft should have, versus the type of experience that the PIC of a small UAS should have, in order to avoid imperiling passengers or property. In UP's case, all property carried aboard the UA will be UP property. While the pilot will be compensated, all risk of damage to the property (in fact to the UAS itself) will be borne by UP. There is no expectation or need for the PIC of the UA to have the type of experience that a commercial pilot for a manned aircraft would have. In short, virtually none of the aeronautical experience requirements, beyond those necessary for private pilots, is relevant to the PIC who will operate the small UAS as proposed in this Petition. Accordingly, there is no reason for a requirement that the PIC of UP's UAS have more experience than that required for the private pilot certificate.

With respect to ***flight proficiency*** requirements for private pilots and commercial pilots, while there are differences, those differences involve areas such as "[h]igh-altitude operation," areas that have no bearing on the small UAS operations at issue in this Petition.[6] To the extent that differences exist between the standards of performance for flight proficiency as demonstrated by prospective private versus prospective commercial pilots, those standards are not significant here where the operations will be conducted strictly during daylight VMC conditions, within VLOS, at altitudes no higher than 400 feet AGL.

Given that UP plans to operate its AirCover UAS in Class G airspace (or, with written FAA approval, in Class, B, C or D airspace) over UP, private or controlled access property at altitudes of

[5] See FAR § 61.129.
[6] Compare FAR § 61.127, flight proficiency for commercial pilots (in particular § 61.127(b)(1)(x) and (b)(2)(x)), with FAR § 61.107, flight proficiency for private pilots.

400 feet AGL or less, the parallel nature of private pilot aeronautical knowledge requirements to those of commercial pilot requirements, the limited airmanship skills necessary to operate the AirCover UAS, and the lack of additional safety benefits for the UAS operations proposed here that would result from commercial pilot experience, the PIC under this exemption should only be required to hold a private pilot certificate and a third-class airman medical certificate. Such a condition would be consistent with the certificate requirements imposed on the UAS PIC in the Astraeus Exemption, Trimble Exemption, and Clayco Exemption.

For these reasons, UP requests that the FAA grant an exemption to permit UP to use as PIC of the proposed UAS operations pilots who hold a private pilot certificate and a third-class airman medical certificate, so long as they satisfy the limits and conditions proposed in this Petition, including the PIC qualification and training requirements.

FAR § 91.7(a) – Civil aircraft airworthiness.

The regulation states in relevant part:

> (a) No person may operate a civil aircraft unless it is in an airworthy condition. . . .

UP requests an exemption from this provision to the extent necessary.[7] The AirCover UAS will not have an airworthiness certificate under FAR Part 21, Subpart H, and thus relief is requested from this regulation. See Trimble Exemption, at 16. An exemption is warranted because UP understands that, notwithstanding the lack of an airworthiness certificate, the FAA will consider its "compliance with [UP's] Manuals to be sufficient means for determining an airworthy condition" and that UP must still determine the UA's airworthiness prior to each flight based on compliance with such Manuals. See Trimble Exemption, at 16.

[7] UP requests exemption from FAR § 91.7(a) based on the relief granted in the Trimble Exemption, at 16, 21. However, UP notes that the FAA determined that no such exemption was needed in the Astraeus Exemption, at 19, 22.

FAR § 91.119(b) and (c) – Minimum safe altitudes: General.

The regulation states:

> Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:
>
> (a) *Anywhere.* An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.
>
> (b) *Over congested areas.* Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.
>
> (c) *Over other than congested areas.* An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.
>
> (d) *Helicopters, powered parachutes, and weight-shift-control aircraft.* If the operation is conducted without hazard to persons or property on the surface—
>
> (1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA; and
> (2) A powered parachute or weight-shift-control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.

UP requests an exemption from this regulation to the extent necessary to permit UP to conduct its UAS operations at altitudes lower than those permitted by FAR § 91.119, since such altitudes are one of the key benefits of using small UAS for the Incident Assessments. Even at these low altitudes, the UAS Incident Assessment Flights will be conducted at a level of safety at least equal to that which would be achieved if larger manned aircraft were to be used at the altitudes required by FAR § 91.119.

With respect to paragraph (a), UP intends to comply with this requirement to the same extent as would a manned aircraft, meaning that the UA must operate at an altitude such that the loss of a single power unit aboard the UA or used by the UAS would still permit an emergency landing "without undue hazard to persons or property on the surface." UP agrees with the FAA's reasoning on this issue in the Astraeus Exemption, at 20, and therefore does not believe that relief is required from paragraph (a).

With respect to paragraph (c), UP requests an exemption to allow UAS operations down to the surface, both in sparsely populated areas and in "other than congested" areas. UP's Incident Assessment Flights require lower-level flying to properly assess the incident. Relief from the 500 foot altitude threshold in this paragraph would be consistent with that granted in the Trimble Exemption, at 18, and the condition that no UA be operated at an altitude higher than 400 feet AGL.

UP further requests an exemption from the requirement in paragraph (c) to stay 500 feet away from any person, vessel, vehicle or structure during all Incident Assessment Flights. An exemption from the 500 feet standoff requirement is essential to allowing UP to conduct Incident Assessment Flights close enough to the situation being assessed to permit UP to acquire the information necessary to determine the best response to the incident. For instance, requiring the UA to stay 500 feet away from all persons would make it virtually impossible to access the scene of a derailment or hazmat release, which will almost always involve people still at the scene of the incident (e.g., UP personnel, first responders, other persons). For many of the UAS operations UP is proposing, any potentially adverse safety implications raised by the operation of the small AirCover UAS near people, vessels, vehicles or structures pale in comparison to the potential danger to which those people, vessels, vehicles or structures might be exposed if the incident is allowed to escalate or an effective response to the incident is prevented or delayed.[8]

[8] For all UP Training Flights under the exemption, the UA would be required to stay at least 500 feet away from all non-participants (all persons who are not part of the crew or participating in the training exercise), as required by FAR § 91.119(c). See also Proposed Condition 3.2.30 above.

Even with a grant of this exemption, the UAS operations will be at least as safe as operations by manned aircraft that comply with this 500 feet standoff requirement. Flying a manned aircraft, given its weight, size, speed, and fuel load, would pose a significant risk if undertaken within the confusing operational environment surrounding an incident. Compared with that scenario, the use of a small UAS, with a smaller size and weight, operating at much lower speeds, with batteries rather than a significant fuel load, and at all times within VLOS of one or more crewmembers on the ground who have a wide view, would result in a far higher level of safety. Accordingly, as the FAA determined in the Trimble Exemption, at 17-18, relief is warranted here provided that UP adheres to its Manuals and the additional conditions and limitations outlined above and in the exemption. For these reasons, UP requests relief from the entirety of paragraph (c).

With respect to paragraph (b), UP has no control over where an incident will occur. Some railroad incidents occur in areas defined by the FAA as congested areas. Even when operating over congested areas, the proposed UAS operations will be far safer than operations by manned aircraft operating in compliance with the minimum altitude requirements (1,000 feet altitude). The operation of a faster, larger manned aircraft, at 1,000 feet over a congested area, with a load of combustible fuel and crew, loitering over the scene of a railroad incident, would not be as safe as such operations conducted by a very small, very light weight, battery-operated UAS that, at all times from takeoff to landing, can be safely operated well below the altitudes used by manned aircraft, and continuously within VLOS of one or more persons on the ground. For these reasons, UP requests relief from the entirety of paragraph (b).

UP does not request relief from paragraph (d), which applies only to helicopters, and which would permit operation at lower altitudes only if on a prescribed helicopter route. Relief from this requirement will not be necessary if the FAA grants relief from paragraphs (b) and (c) as noted above.

FAR § 91.121 – Altimeter settings.

The regulation states:

> (a) Each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating—
>
> (1) Below 18,000 feet MSL, to—
>
> (i) The current reported altimeter setting of a station along the route and within 100 nautical miles of the aircraft;
> (ii) If there is no station within the area prescribed in paragraph (a)(1)(i) of this section, the current reported altimeter setting of an appropriate available station; or
> (iii) In the case of an aircraft not equipped with a radio, the elevation of the departure airport or an appropriate altimeter setting available before departure; or
>
> (2) At or above 18,000 feet MSL, to 29.92″ Hg.
>
> (b) * * * *.

UP requests an exemption from FAR § 91.121 to the extent necessary to permit UP to conduct the UAS operations described in this Petition. It is not clear to UP that an exemption from this section is required. Although the regulation expressly applies only to aircraft maintaining a "cruising altitude" and dictates the altimeter setting that must be used while at that cruising altitude, cruising altitudes for VFR flight do not begin – according to FAR § 91.159 – until "more than 3,000 feet above the surface."[9] See Astraeus Exemption, at 21-22 (granting relief from this section with conditions and limitations).

Nevertheless, UP recognizes the critical importance of ensuring that any UAS operated by UP maintain altitude to an accurate reference such that other aircraft and the FAA may rely on UP's UAS to be operating as proposed. The AirCover UAS does not use a barometric altimeter. Instead, it determines altitude based on a GPS signal. To ensure the accuracy of the GPS signal, the PIC will check the UA altitude reading prior to each takeoff, and will effectively zero the UA's altitude

[9] FAR § 91.159; see also Aeronautical Information Manual, at Chpt. 3, Sec. 1, Tbl. 3-1-1, para. 3-1-2. (Jul. 24, 2014).

reading of the altimeter at the point of takeoff, to ensure that measurements of the UA's altitude are as accurate as possible relative to the local elevation. To the extent that this methodology does not satisfy FAR § 91.121 or any other regulation, UP requests an exemption to permit UAS operations using this methodology.

FAR § 91.151 – Fuel requirements for flight in VFR conditions.

The regulation states:

> (a) No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed—
>
> (1) During the day, to fly after that for at least 30 minutes; or
> (2) At night, to fly after that for at least 45 minutes.
>
> (b) No person may begin a flight in a rotorcraft under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, to fly after that for at least 20 minutes.

UP requests an exemption from FAR § 91.151 to permit UP to plan its UAS operations such that only 10 minutes of further operating time is available at the end of the planned UAS operation. The UAS operations proposed by UP in this Petition will involve operations in which one or more UAS is transported by means other than its own power to the site of an incident. The Incident Assessment Flights will begin and end at the site of the incident, with the takeoff, entire flight, and landing all taking place within the immediate proximity of the incident, and remaining at all times within VLOS of the PIC. In essence, each UA will virtually never leave its "first point of intended landing."

The goal of FAR § 91.151 is to ensure that pilots plan for an extra 20 or 30 minutes of fuel at their first intended point of landing. This accounts for unexpected possible delays en route (such as adverse winds) and at the first planned destination (such as a fouled runway or conflicting traffic). Many of these delays that plague manned aircraft are not an issue with these UAS operations, since

there is virtually no "en route" portion of the flight, and any problems at the point of landing are extremely unlikely to cause delays, since a UA can always land just a few feet away if the intended point of landing becomes unusable.

Given the AirCover UAS' relatively short operating time (30 minutes), requiring a full 30 minutes of reserve fuel would basically take up all of the available time for UAS operations. UP believes that using a smaller reserve for UAS flight planning purposes will be at least as safe as using the reserves required by FAR § 91.151 for manned aircraft. Using a 10-minute reserve for a daylight UA flight, for instance, will be adequate where the UA is essentially at its first point of landing from the moment it takes off (since there is no en route phase of flight) and the risks for delay at the intended landing area are not as great as for manned aircraft landings. As a further measure of safety, UP also will require the PIC to begin terminating operations when no less than 25% of battery life remains. Although FAR § 91.151 is a flight planning requirement, rather than an operational requirement, UP believes that having a requirement to begin terminating operations no later than at a specific "fuel" (battery power) level will further ensure that the 10-minute reserve fuel planning requirement that UP is requesting to use under the exemption will provide an adequate level of safety.

For these reasons, UP requests an exemption from FAR § 91.151 to permit UP to plan UAS operations such that only 10 minutes of further operating time is available at the end of the planned UAS operation. This means that, if the FAA views the AirCover UAS as a fixed wing UAS, UP requests an exemption from paragraph (a) to permit 10 minutes instead of 30 minutes of reserve time, and, if the FAA views the AirCover UAS as a rotorcraft UAS, UP requests an exemption from paragraph (b) to permit 10 minutes instead of 20 minutes of reserve time.

FAR § 91.405(a) – Maintenance required.

The regulation states:

> Each owner or operator of an aircraft—

> (a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter;
>
> (b) ****.

UP requests an exemption from FAR § 91.405(a) to permit UP to conduct its small UAS operations as proposed in this Petition without having to perform the inspections and discrepancy repairs required by FAR § 91.405(a). In the Astraeus Exemption and the Trimble Exemption, the FAA determined that the proposed UAS operations required exemption from FAR § 91.405(a), and that the achievement of an adequate level of safety required certain conditions and limitations, some of which were proposed by the Petitioner, and some of which were required by the FAA ("Astraeus/Trimble Conditions and Limitations"). These included requirements to develop and document maintenance, overhaul, replacement, and inspection requirements in the absence of manufacturer's requirements; procedures to document and maintain maintenance records with regard to the petitioner's UAS; UAS technician qualification criteria; and requirements to document comprehensive preflight inspection procedures.

UP has proposed several conditions and limitations in Section 3 of this Petition related to maintenance and inspections consistent with the Astraeus/Trimble Conditions and Limitations. UP believes that these conditions and limitations provide a level of safety at least equivalent to that provided by FAR § 91.405(a), the Astraeus Exemption, and the Trimble Exemption. For this reason, UP requests an exemption from FAR § 91.405(a) to permit UP to conduct UAS operations as proposed in this Petition, subject to the conditions and limitations proposed above, without having to perform the inspections and discrepancy repairs required by FAR § 91.405(a).

UP does not believe that an exemption from the remaining paragraphs of FAR § 91.405 is required, since UP will make appropriate logbook entries in aircraft maintenance records in accordance with paragraph (b), appropriately mark any inoperative instrument or item of equipment

for which maintenance has been properly deferred in compliance with paragraph (c), and appropriately placard listed discrepancies that include inoperative instruments or equipment in compliance with paragraph (d).

FAR § 91.407(a)(1) – Operation after maintenance, preventive maintenance, rebuilding or alteration.

The regulation states:

> (a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—
>
> (1) It has been approved for return to service by a person authorized under §43.7 of this chapter; and
> (2) The maintenance record entry required by §43.9 or §43.11, as applicable, of this chapter has been made.
>
> (b) **** .
>
> (c) **** .

UP requests an exemption from FAR § 91.407(a)(1) to permit UP to conduct UAS operations as proposed in this Petition without having to have the UAS approved for return to service by a person authorized under FAR § 43.7. In the Astraeus Exemption and the Trimble Exemption, the FAA determined that the proposed UAS operations required exemption from FAR § 91.407(a)(1), and that achieving an adequate level of safety required conditions and limitations similar to those in the Trimble Exemption and the Astraeus Exemption.

UP has proposed several conditions and limitations in Section 3 of this Petition related to maintenance and inspections consistent with the Astraeus/Trimble Conditions and Limitations. UP believes that these conditions and limitations provide a level of safety at least equivalent to that provided by FAR § 91.407(a)(1), the Astraeus Exemption, and the Trimble Exemption. For this reason, UP requests an exemption from FAR § 91.407(a)(1) to permit UP to conduct UAS

operations as proposed in this Petition, subject to the proposed conditions and limitations, without having to have the UAS approved for return to service by a person authorized under FAR § 43.7.

UP does not believe that an exemption from the remaining paragraphs of FAR § 91.407 is required, since UP will require that maintenance record entries are made as required in compliance with paragraph (a)(2), and since no persons will be carried following maintenance performed on the UAS, making paragraphs (b) and (c) moot.

FAR § 91.409(a)(1) and (2) – Inspections.

The regulation states:

> (a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—
>
> (1) An annual inspection in accordance with part 43 of this chapter and has been approved for return to service by a person authorized by §43.7 of this chapter; or
> (2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.
>
> No inspection performed under paragraph (b) of this section may be substituted for any inspection required by this paragraph unless it is performed by a person authorized to perform annual inspections and is entered as an "annual" inspection in the required maintenance records.
>
> (b) ****.

UP requests an exemption from FAR § 91.409(a)(1) and (2) to permit UP to conduct UAS operations as proposed in this Petition without having to obtain the annual inspection and airworthiness certificate inspection required by FAR § 91.409(a)(1) and (2). In the Astraeus Exemption and the Trimble Exemption, the FAA determined that the proposed UAS operations required exemption from FAR §91.409(a)(1) and (2), and that achieving an adequate level of safety required conditions and limitations similar to the Astraeus/Trimble Conditions and Limitations.

UP has proposed several conditions and limitations in Section 3 of this Petition related to maintenance and inspections consistent with the Astraeus/Trimble Conditions and Limitations. UP believes that these conditions and limitations provide a level of safety at least equivalent to that provided by FAR § 91.409(a)(1) and (2), the Trimble Exemption, and the Astraeus Exemption. For this reason, UP requests an exemption from FAR § 91.409(a)(1) and (2) to permit UP to conduct UAS operations as proposed in this Petition, subject to the proposed conditions and limitations, without having to obtain the annual inspection and airworthiness certificate inspection required by FAR § 91.409(a)(1) and (2).

FAR § 91.417(a) and (b) – Maintenance records.

The regulation states:

> (a) Except for work performed in accordance with §§91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:
>
> (1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—
>
> (i) A description (or reference to data acceptable to the Administrator) of the work performed; and
>
> (ii) The date of completion of the work performed; and
>
> (iii) The signature, and certificate number of the person approving the aircraft for return to service.
>
> (2) Records containing the following information:
>
> (i) The total time in service of the airframe, each engine, each propeller, and each rotor.
>
> (ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

> (iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.
>
> (iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.
>
> (v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required.
>
> (vi) Copies of the forms prescribed by §43.9(d) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.
>
> (b) The owner or operator shall retain the following records for the periods prescribed:
>
> (1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.
>
> (2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.
>
> (3) A list of defects furnished to a registered owner or operator under §43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.
>
> (c) ****.

UP requests an exemption from FAR § 91.417(a) and (b) to permit UP to conduct UAS operations as proposed in this Petition without having to keep the records described in FAR § 91.417(a) and (b). In the Trimble Exemption and the Astraeus Exemption, the FAA determined that the proposed UAS operations required exemption from FAR §91.417(a) and (b), and that an

adequate level of safety required conditions and limitations similar to those in the Trimble Exemption and the Astraeus Exemption.

UP has proposed several conditions and limitations in Section 3 of this Petition related to maintenance, inspections, and records consistent with the Astraeus/Trimble Conditions and Limitations. UP believes that its conditions and limitations provide a level of safety at least equivalent to that provided by FAR § 91.417(a) and (b), the Trimble Exemption, and the Astraeus Exemption. For this reason, UP requests an exemption from FAR § 91.417(a) and (b) to permit UP to conduct UAS operations as proposed in this Petition, subject to the proposed conditions and limitations, without having to keep the records described in FAR § 91.417(a) and (b).

Additional FAR Provisions.

UP also requests that, to the extent that the FAA concludes that an exemption from one or more other provisions of the FAR would be required to permit the UAS operations described in this Petition, the FAA grant an exemption from those FAR provisions as necessary to permit the UAS operations described in this Petition.[10]

5.4 Reason why granting the request would be in the public interest:

A grant of the exemption would be in the public interest because it would improve safety for the general public, first responders, and UP employees.

The ability to use a UAS to conduct Incident Assessment Flights, subject to the conditions and limitations proposed in this Petition, will enable UP to have access to more complete data about incidents. This is because the scene of an incident often contains unknown or difficult-to-access terrain or structures, or unsafe structures, such as bridges, that may have been degraded by the incident. The ability to use UAS to develop data about the scene of an incident will ensure that UP

[10] If requested, UP will provide follow-on documentation providing the rationale underlying any such additional exemption.

can gather the best possible information, which will enable UP to develop a safe and effective response plan that minimizes the risk of harm to the general public and first responders.

In addition, the use of the small, lightweight, battery-powered AirCover UAS for these Incident Assessment Flights is far less risky than undertaking those operations with a much heavier, much faster, much larger, manned helicopter or other aircraft loaded with fuel. As the FAA acknowledged in the Trimble Exemption, at 13:

> "The [UP] pilot and crew will be remotely located from the aircraft. The limited weight and construction with impact absorbent materials significantly reduces the potential harm to persons or damage to property in the event of an incident or accident. The risk to an onboard pilot and crew during an incident or accident is eliminated with the use of a UAS for the . . . operation.
>
> Manned aircraft are at risk of fuel spillage and fire in the event of an incident or accident. [The AirCover UAS] carries no fuel [it is battery-powered] and therefore the risk of fire following an incident or accident due to fuel spillage is eliminated."

These distinctions, coupled with the safety-related features of the AirCover UAS such as loss-link procedures, demonstrate that the AirCover UAS operations by UP proposed in this Petition are far less risky than if operated by larger and heavier manned aircraft.

Further, the ability to use a UAS to conduct Incident Assessments will decrease the risk to UP employees who would otherwise be tasked with obtaining information about the incident scene. Incident Assessments by their very nature involve danger, whether it be from being too close to the release of hazmat into the environment or exposure to fire or some other hazard associated with a derailment. In all of these incidents, UP must quickly obtain accurate information to determine how to respond to the incident, and then develop and implement a response plan. The use of a UAS to conduct the Incident Assessment would protect UP employees, while at the same time improving the quality of information obtained from the assessment.

5.5 Reason why granting the exemption would not adversely affect safety, or how the exemption would provide a level of safety at least equal to that provided by the rule from which exemption is sought:

Throughout this Petition, UP has noted reasons why the grant of an exemption from each section of the FAR from which relief is sought would result in small UAS operations that provide a level of safety at least equal to that provided by the rule from which exemption is sought.

In general, the risks of any proposed UAS operation interfering with a manned aircraft are minimized by the low altitude at which the UAS will operate. This, combined with the conditions and limitations proposed in the Petition, provides further protection against interference with manned aircraft operations or with the safety of persons or property on the ground. The UAS will operate in a limited area in the immediate vicinity of the railroad incident and, to the extent reasonably practical, over UP property or other private or controlled access property with permission or an easement from the land owner/controller or authorized representative. The UAS has robust safety procedures in case of unpredicted obstacles, unforeseen emergencies, and loss of communications or GPS signal. And, as detailed in Section 3.1, the QR-425 has a substantial and incident-free developmental and operational history. In addition, under the conditions and limitations proposed in this Petition, UP will coordinate with the FAA, with local airports, and with property owners to ensure that all UAS operations under the exemption are at least as safe as would be manned aircraft operations used for similar purposes.

For these reasons, granting an exemption from each section of the FAR from which relief is sought would not adversely affect safety, and would provide a level of safety at least equal to, or greater than, that provided by the rule from which exemption is sought.

5.6 Summary that can be published in Federal Register, including the rule from which exemption is sought, a brief description of the nature of the exemption sought:

UP proposes that the FAA use the following as the summary:

> Docket No.: FAA-2014-_____
>
> *Petitioner:* Union Pacific Railroad
>
> *Sections of 14 CFR:* 61.113(a) and (b), 91.7(a), 91.119(b) and (c), 91.121, 91.151, 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b).
>
> *Description of Relief Sought:* Petitioner seeks an exemption to conduct small UAS operations in its railroad business as a means of assessing circumstances following an incident that involves Union Pacific property and/or personnel and for training flights.

5.7 Additional information that supports request:

UP is prepared to provide additional information that the FAA might find helpful, or to answer questions in response to any FAA requests. A confidential copy of the Manuals will be submitted to the FAA Assistant Chief Counsel for International Law, Legislation, and Regulations as supporting documentation for this Petition. The Manuals contain information that is highly proprietary to UP and/or AirCover, and UP requests that the FAA treat the Manuals as confidential and not disclose them to the public.

5.8 Request to exercise the privileges of the exemption outside the U.S.:

UP does not request to exercise the privileges of the exemption outside the United States.

5.9 Attachments:

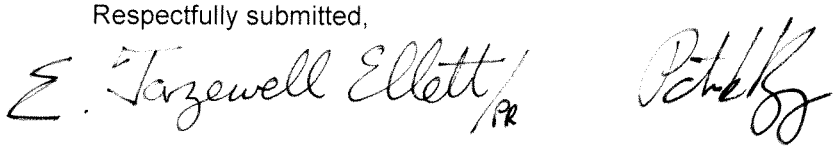
In support of this Petition, UP will provide copies of the Manuals to the FAA Assistant Chief Counsel for International Law, Legislation, and Regulations. As noted above, UP requests confidential treatment by the FAA of the Manuals. These documents contain non-public, confidential information that is highly proprietary to UP and/or AirCover. These confidential documents are also

submitted under 14 C.F.R. § 11.35(b), and are exempt from public disclosure under the Freedom of Information Act, 5 U.S.C. § 552 et seq.

6. CONCLUSION

For the foregoing reasons, UP respectfully requests that the FAA grant this Petition for Exemption.

Respectfully submitted,



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HL Doc. 6198441v7