

32nd Meeting of the Informal South Pacific Air Traffic Services Coordinating Group (ISPACG/32)

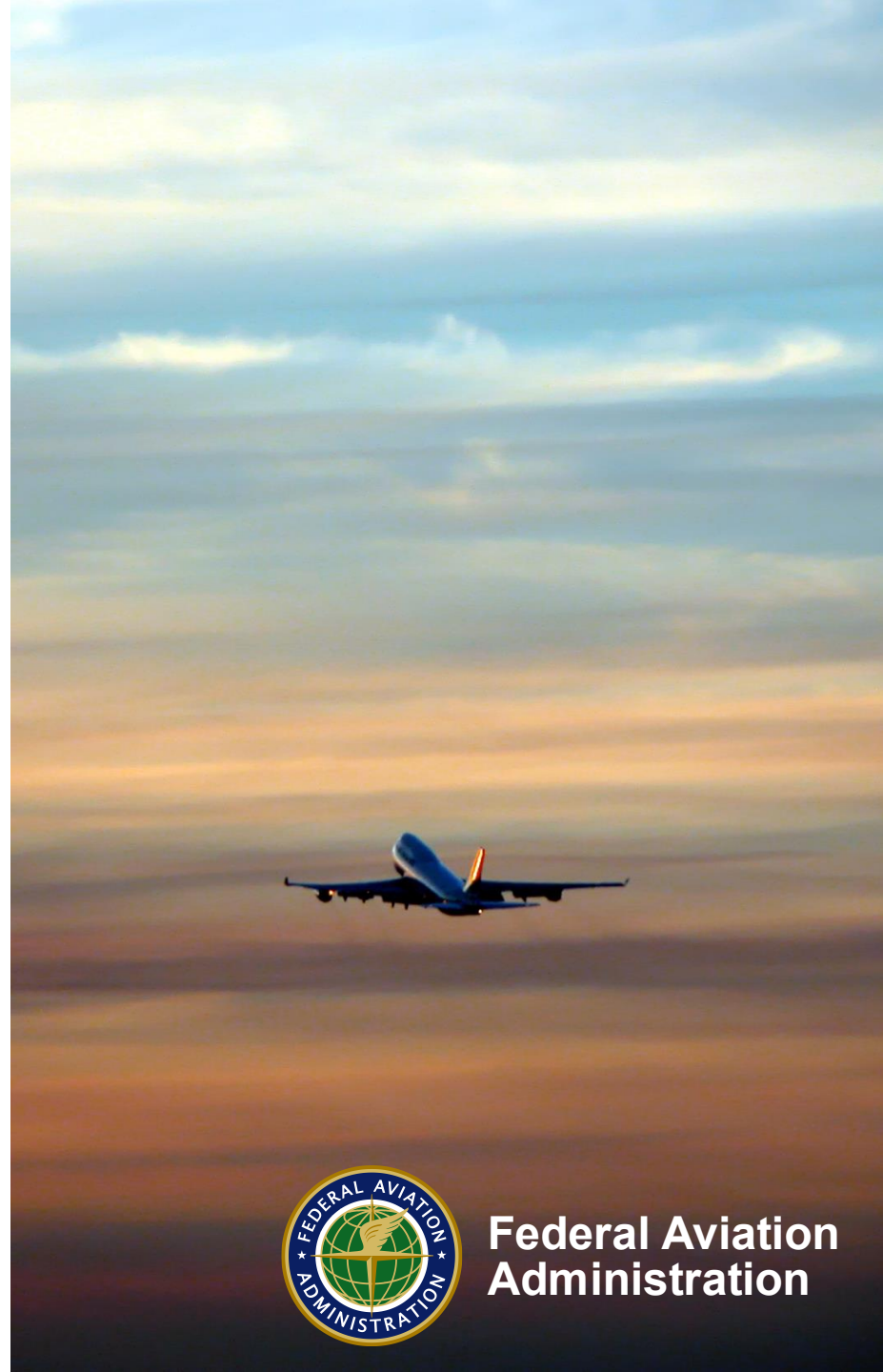
Acceptable Level of Risk (ALR)

Prepared by: Coleen Hawrysko

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**Federal Aviation
Administration**



ALR Background

- Increasing Commercial Space activity
- FAA Commercial Space Transportation (AST) and the FAA Air Traffic Organization (ATO) use different safety standards
- Safety panel concluded existing high hazard
- ATO proposed the ALR concept
- FAA SMS Executive Council:
 - Originally approved ALR for 6 months
 - Established ALR Tactical Team
 - Approved ALR temporarily

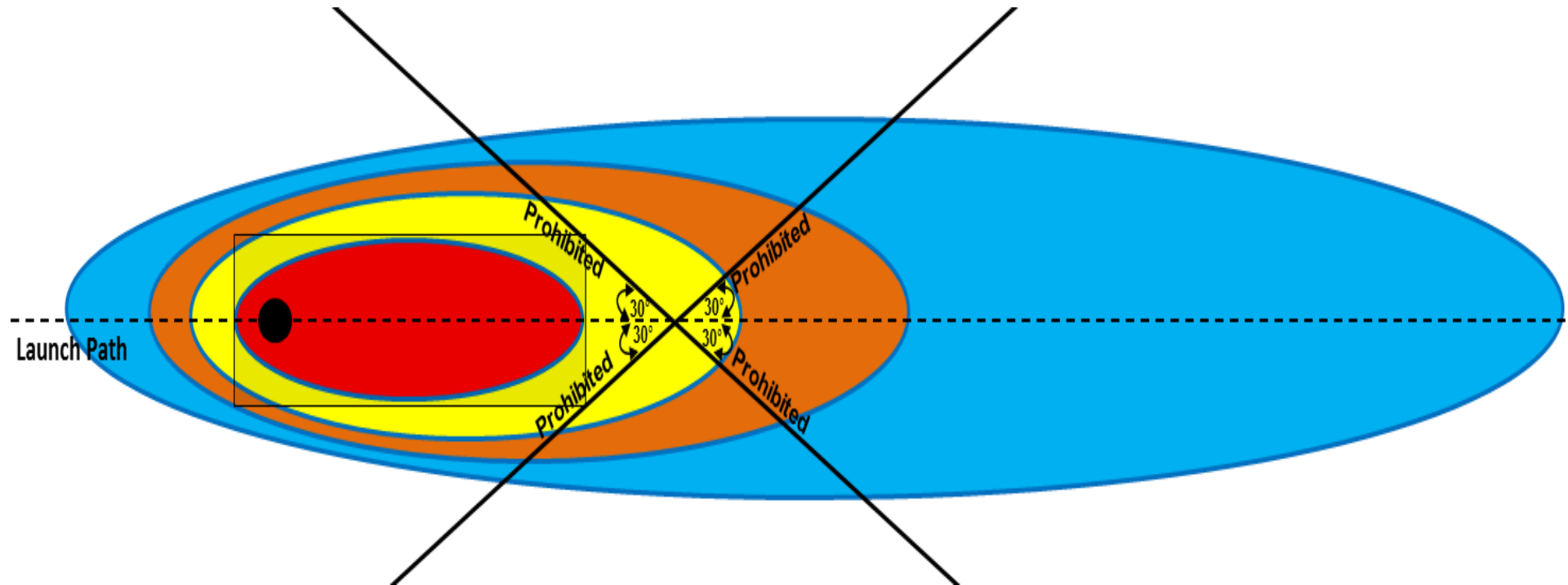


ALR: The Specifics

- Individual aircraft can be exposed to risk up to 1×10^{-7}
- Introduces Collective Risk
- Restrictions allow aircraft to fly up to the 1×10^{-6} contour



AHA Diagram

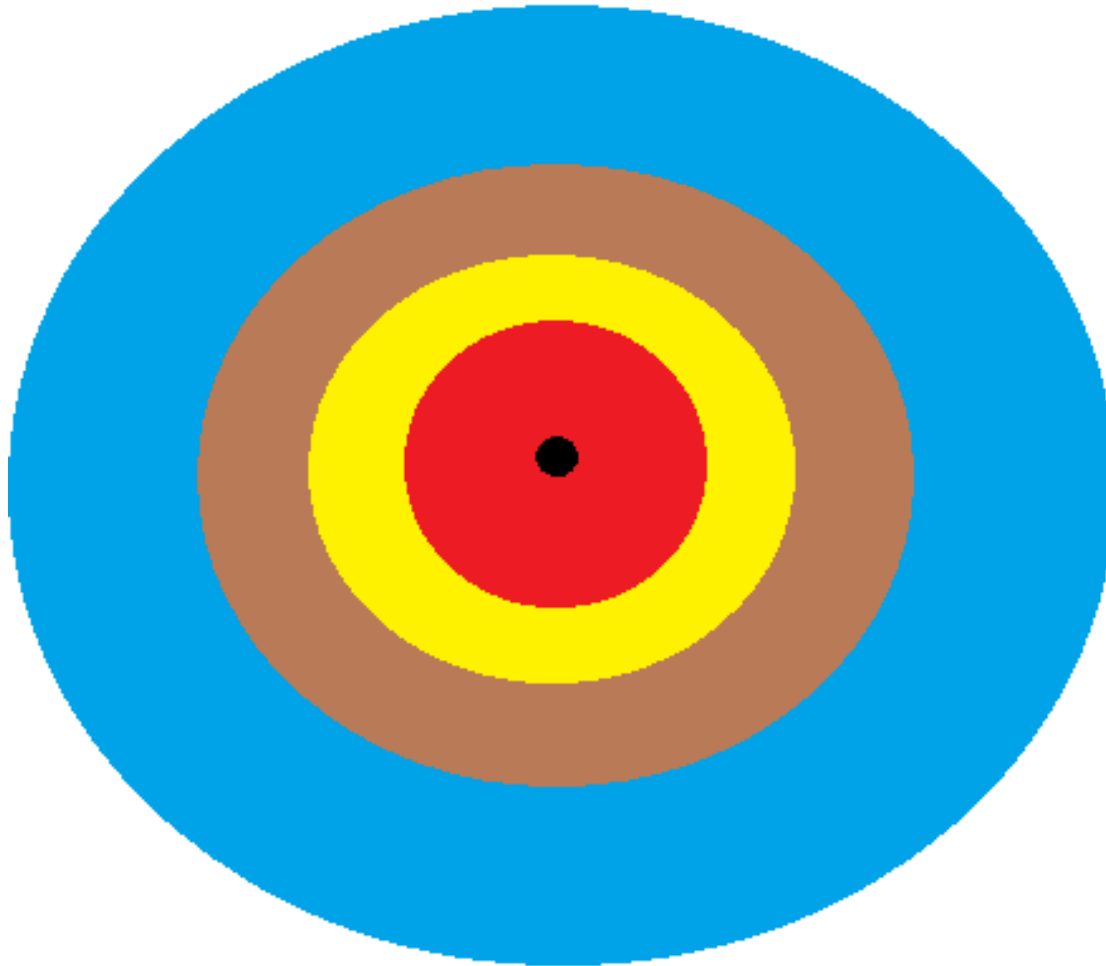


Routes with Angular Difference Less Than 30 Degrees from Launch Path Are Closed

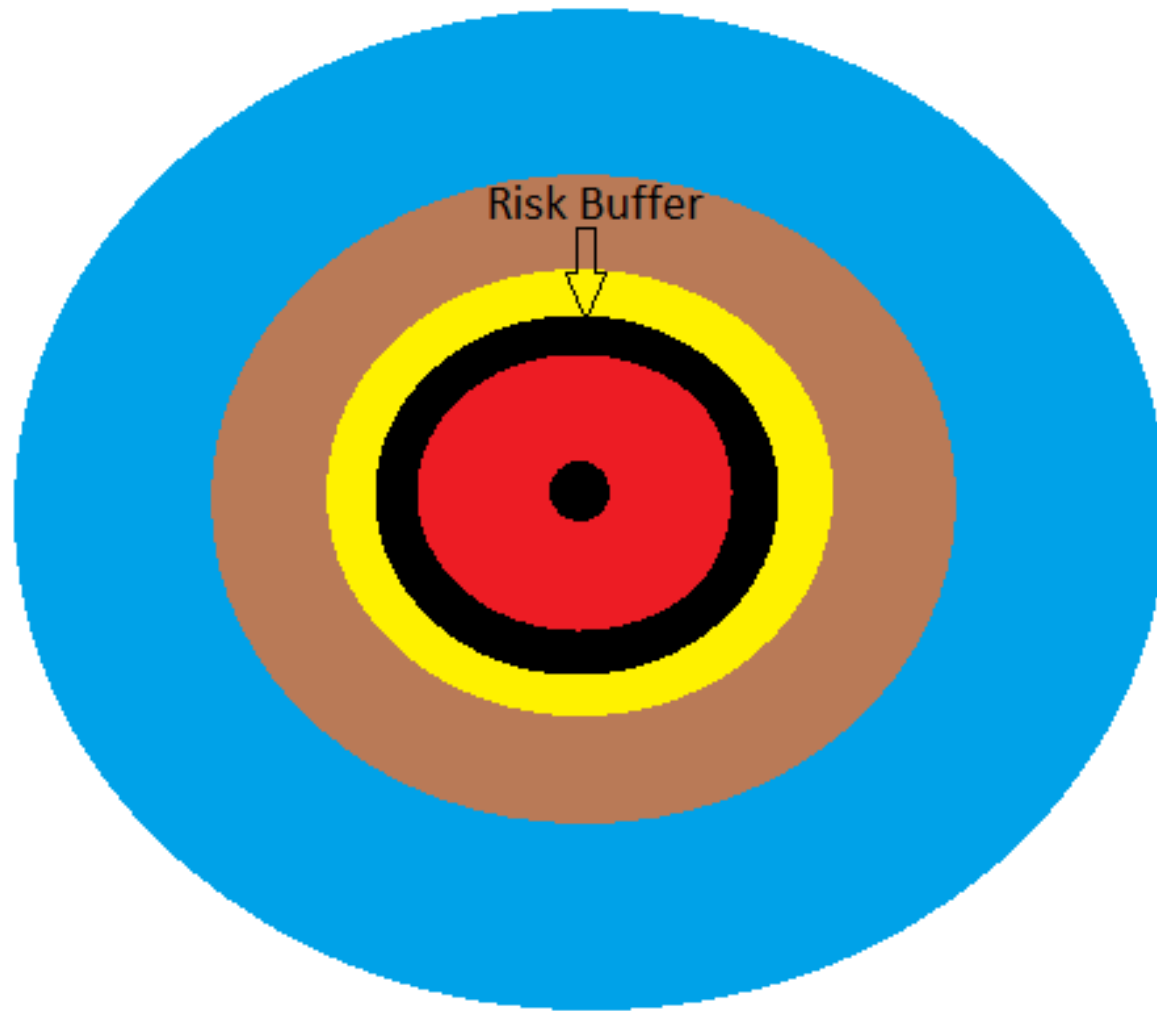


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Suborbital AHA



Suborbital AHA



Mission Type Summary

Mission Type	Enough Info on Mission Type	Data Available to Compute AHA	Vehicle Flight Path Has Sufficient Horizontal Component
2.1.1. Launch Barge Fly-Back	✓	✓	✓
2.1.2. Launch Site Fly-Back	✓	✓	✓
2.1.3. Capsule Reentry	✓	✓	✓
2.1.4. Expendable Launch Without Fly-Back	✓	✓	✓
2.1.5. Horizontal Orbital	✓	✓	✓
2.1.6. Captive Carry Orbital *	✓	✓	✓
2.1.7. Horizontal Suborbital	✓	✓	-
2.1.8. Captive Carry Suborbital *	✓	✓	-
2.1.9. Vertical Launch Suborbital Expendable Booster	✓	✓	-
2.1.10. Vertical Launch Suborbital Reusable Booster	✓	✓	-
2.1.11. Winged Reentry **	✓	✓	-
2.1.12. Stratospheric Manned Balloons	✓	-	-
2.1.13. Balloon Launch	-		
2.1.14. Point-to-Point	-		
2.1.15. Tube and Rail Launchers	-		

*AHA can be computed for the point from which the launch vehicle is released from the aircraft.

** During reentry, the vehicle makes turns that are not always predictable and the AHA does not extend to the phase of flight in which the turns are made.



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Mission Type	Enough Info on Mission Type	Data Available to Compute AHA	Vehicle Flight Path Has Sufficient Horizontal Component
2.1.1. Launch Barge Fly-Back	✓	✓	✓
2.1.2. Launch Site Fly-Back	✓	✓	✓
2.1.3. Capsule Reentry	✓	✓	✓
2.1.4. Expendable Launch Without Fly-Back	✓	✓	✓
2.1.5. Horizontal Orbital	✓	✓	✓
2.1.6. Captive Carry Orbital *	✓	✓	✓
2.1.7. Horizontal Suborbital	✓	✓	-
2.1.8. Captive Carry Suborbital *	✓	✓	-
2.1.9. Vertical Launch Suborbital Expendable	✓	✓	-
2.1.10. Vertical Launch Suborbital Reusable	✓	✓	-
2.1.11. Winged Reentry **	✓	✓	-
2.1.12. Stratospheric Manned Balloons	✓	✓	-
2.1.13. Balloon Launch	-	-	-
2.1.14. Point-to-Point	-	-	-
2.1.15. Tube and Rail Launchers	-	-	-

Apply ALR without modification

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2.1.11. Winged Reentry **	✓	✓	-
2.1.12. Stratospheric Manned Balloons	✓	-	-
2.1.13. Balloon			
2.1.14. Point-to-point			
2.1.15. Tube and			

*AHA can be computed

** During reentry turns are made.

Apply ALR with modification (replace 30-degree angular restriction with buffer, provided by AST, in addition to the AHA)



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2.1.1.3. Capsule Reentry	✓	✓	✓
2.1.1.4. Expendable Launch Without Fly-Back	✓	✓	✓
2.1.1.5. Ho	✓	✓	✓
2.1.1.6. Ca	✓	✓	✓
2.1.1.7. Ho	✓	✓	-
2.1.1.8. Ca	✓	✓	-
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2.1.1.12. Stratospheric Manned Balloons	✓	-	-
2.1.1.13. Balloon Launch	-		
2.1.1.14. Point-to-Point	-		
2.1.1.15. Tube and Rail Launchers	-		

Apply ALR without modification

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Post ALR

- SDI: Space Data Integrator
 - Tracks space vehicles
- HRAM: Hazard Risk Assessment and Management
 - Present Refined Hazard Areas on scopes

