Presentation Outline

• Principles of Aircraft Noise Control

• Noise Abatement Options
  – Airfield Design
  – Operational
  – Restrict Operations
  – Management

• Noise Mitigation Options
  – Preventive
  – Remedial
Principles of Aircraft Noise Control

- Source
- Path
- Receiver
Principles of Aircraft Noise Control

- Reduce the source level
  - FAA is responsible for aircraft noise certification
  - Pilots may use reduced thrust
  - Ground crews can minimize APU use
  - Reduce or eliminate engine runups
Principles of Aircraft Noise Control

• Move the source or the receiver
  – Relocated runways, relocated taxiway, relocated run-up areas
  – Displaced takeoff or landing thresholds
  – Relocate noise sensitive uses
Principles of Aircraft Noise Control

• When moving aircraft away from residents, it takes a doubling of the distance to achieve a 6-dB reduction in the noise level.

• Except for direct overflight, *slant range* is more important than *altitude*.
Noise Abatement – Aircraft in Flight

• Example: Double the altitude
Noise Abatement – Aircraft in Flight

• Example: Double the slant range
Principles of Aircraft Noise Control

• Block the path – insertion loss
  – Barriers, berms, buildings
Principles of Aircraft Noise Control

• Maximum insertion loss is achieved when the source and receiver are close to the barrier
  – Highway noise barriers, ground run-up enclosures
NCP Measures That Are Required to Be Considered
(14 CFR Part 150, Section B150.7)

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* Subject to further notice, review, and approval requirements in 14 CFR Part 161.
Major NCP Strategy Options

**Noise Abatement**
- Noise abatement flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Runup enclosures
- Use restrictions*
- Other actions proposed by stakeholders

**Land Use**
- Remedial Mitigation
  - Land acquisition
  - Sound insulation
  - Avigation easements
- Preventative Mitigation
  - Land use controls
  - Zoning
  - Building codes
  - Comprehensive plans
  - Real estate disclosures
- Other actions proposed by stakeholders

**Programmatic**
- Implementation tools
- Promotion, education, signage, etc.
- Monitoring
- Reporting
- NEM update
- NCP revision
- Other actions proposed by stakeholders

* Subject to further notice, review, and approval requirements in 14 CFR Part 161.
Noise Abatement Options

• Noise abatement techniques can be applied to address:
  – Ground noise
  – Noise from aircraft in flight

• Techniques should be safe, cost effective, environmentally balanced, and capable of being implemented to be successful
Noise Abatement Options

- Standard evaluation criteria
  - Level of noise reduction
  - Effects on airfield capacity and aircraft delay
  - Effects on airspace/air traffic control procedures
  - Consistency with FAA safety and other standards
  - Other environmental effects (e.g., air quality)
  - Operational effects and costs
  - Financial feasibility
  - Consistency with policies adopted by Airport Proprietor
Noise Abatement Options

• Airfield Design
  – Runway extensions, new runway construction
  – Decommission existing runways
  – Relocate runway thresholds

• Operational
  – Dispersing departure flight tracks
  – Advanced navigational technologies
  – Change departure flight profiles
  – Modify arrival flight profiles
  – Rotational runway use
  – Ground run-up facility
Noise Abatement Options

• Restrict operations*
  – Ground run-up restrictions
  – Curfews
  – Noise level restrictions
  – Noise budget
  – Limit number of operations

*Subject to ANCA and potentially 14 CFR Part 161.
Noise Abatement Options

• Management
  – Pilot awareness program
  – Fly Quiet program
  – Noise sensitive areas noted in navigation charts
Noise Abatement Options

- Ground noise can come from several sources:
  - Start of takeoff roll
  - Aircraft taxiing on the airfield
  - Reverse thrust on landing roll out
  - Maintenance activities on the airfield
  - Ground equipment for aircraft servicing
  - Auxiliary power units
Noise Abatement Options

• Noise abatement techniques to consider for addressing noise from taxiing aircraft:
  – Changes in runway location, length, or strength
  – Installation of high-speed exit taxiways
  – Terminal relocation
  – Noise barriers or berms
  – Establish preferential runway use
  – Establish restrictions on ground aircraft movement
  – Establish use restrictions (e.g., single-engine taxiing)
  – Tug to runway ends or into gates
Noise Abatement Options

- Noise abatement techniques to consider for addressing noise from ground support equipment:
  - Relocation of terminals or aircraft parking stands
  - Ground power plug-ins
  - Noise barriers
  - Establish limits on the use of ground equipment
  - Establish use restrictions
Noise Mitigation Options

• Remedial
  – Property acquisition
  – Redevelopment programs
  – Sound insulation
  – Avigation easements
  – Transaction assistance

• Preventive
  – Comprehensive planning
  – Growth management
  – Noise overlay zones
  – Property disclosure statements
Noise Mitigation Options

Property Acquisition

• This strategy is generally used for properties located within areas exposed to the highest noise levels (> 75 dB DNL)

• Properties are purchased and residents are relocated

• Some local communities dislike this practice because the purchase of the property removes it from the local tax roll

• However, the new compatible uses can be tax generating
Noise Mitigation Options

Property Acquisition (cont.)

- Need to evaluate the potential for fragmentation or elimination of neighborhoods
- Only way airport operator can be assured of long-term protection for compatible land use
- This strategy can be very costly
- Public relations value of the program can be very positive or very negative
Noise Mitigation Options

Sound Insulation

• This strategy is generally used for properties located within noise levels between 65 DNL and 75 DNL and interior noise levels greater than 45 DNL
• Homes receive new doors, windows, sealing of leaks, and other treatments to bring the interior noise level in the home to 45 DNL
• The general condition, age, and home state of repair will determine degree of soundproofing needed
Noise Mitigation Options

Sound Insulation (cont.)

• FAA also requires at least a 5-dB reduction in the exterior-to-interior sound level

• FAA Order 5100.38D requires that the home be both within the FAA-accepted 65 DNL contour and the interior noise level be greater than 45 dB DNL
Noise Mitigation Options

Sound Insulation (cont.)

• Avigation Easements are often secured in return for accepting the sound insulation package, the homeowner will not sue the airport over aircraft noise levels.

• This strategy is generally favored by most airports due to lower cost and community acceptance when compared to acquisition, but can be costly.
Noise Mitigation Options

Avigation Easements

• Airport operator pays the property owner a monetary sum in exchange for an agreement that the property owner will not sue the airport for damages associated with aircraft noise.

• Not a popular option with most airports because it does not change the incompatibility with aircraft noise levels.

• FAA has stopped funding this option for the reason stated above.
Noise Compatibility Programs

• All measures must:
  – Reduce incompatible land use and prevent or reduce future incompatible land use
  – Ensure safety and efficiency
  – Be consistent with the powers and duties of the FAA
  – Be subject to revision if necessary
Noise Compatibility Programs

- Noise restrictions or rules must:
  - Not unjustly discriminate
  - Not impose an undue burden on interstate commerce (requires balancing of interests)
  - Meet both local needs and national air transportation system needs
Noise Compatibility Programs

• May be subject to ANCA and 14 CFR Part 161
  – Curfews, noise limits, etc.
  – FAA does not approve noise rules and restrictions through the 14 CFR Part 150 process

• Even if not subject to 14 CFR Part 161, must withstand rigorous scrutiny
  – Reduce existing land use incompatibility above DNL 65
  – Be reasonable and not unjustly discriminatory
  – No undue burden on interstate commerce
Principles of Aircraft Noise Control

Noise Compatibility Programs
Difficulty of Obtaining FAA Approval

Noise Restrictions
Preferential Flight Tracks
Sound Insulation
Local Zoning

No approval needed
Often Approved
Balancing Interests
Opposed In Principle

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Questions?