Part 36 Stage Analysis

Presentation to:
Noise Compatibility Committee
April 27, 2017
Aircraft must meet Part 36 standards to obtain new or revised "type" or "airworthiness" certificates to operate in the U.S.

Standards vary with “design” criteria, including (in part):
- Type of propulsion (e.g. turbojet- or propeller-driven)
- Weight (e.g., “small” aircraft under 12,500 pounds, and “large” aircraft)
- Fixed-wing versus rotary-winged aircraft
- etc.

Certification for jets is based on three measurements
- Landing
- Sideline
- Takeoff

Locations can vary with aircraft stage and number of engines.
Evolution of Jet Part 36 “Stages”

- 1969: Established initial Part 36 standards
  - Aircraft were “certificated” or “uncertificated” – no “stages”
- 1977: Increased stringency of limits and introduced stages
  - “Stage 1” aircraft have never been shown to meet any noise standards
  - “Stage 2” aircraft meet original noise limits, set in 1969
  - “Stage 3” aircraft meet more stringent limits, established in 1977
- 2006: Added Stage 4
  - Cumulative 10 EPNdB below Stage 3 limits across all three measurement locations (in any combination)
- There is an ICAO proposal for a “Stage 5” standard that is:
  - 7 dB quieter than Stage 4, 17 dB quieter than Stage 3
  - Would apply to jet aircraft at the following dates:
    - Aircraft weighing over 55 metric tonnes (approx. 120,000 lbs.) in 2018
    - Lighter aircraft not until 2021 (i.e., effective date for aircraft that use APF)
- Stage 2 jets banned at APF in 2002, nationwide in 2016
  - There are no phase outs proposed for Stages 3 or 4
Part 36 Stages
Comparisons of Single Event Level Graphics

- **Stage 2 Corporate Jet**
  - Learjet 25
  - Early Stage 2 jet
  - SEL 95
  - SEL 90
  - SEL 85
  - SEL 80

- **Stage 3 Corporate Jet**
  - Beechjet 400
  - True Stage 3 jet
  - SEL 95
  - SEL 90
  - SEL 85
  - SEL 80

- **Stage 3 Corporate Jet**
  - Cessna Citation III/VI/VII (C850)
  - Jet certificated as Stage 3, but that meets Stage 4
  - SEL 95
  - SEL 90
  - SEL 85
  - SEL 80

- **Stage 3 Corporate Jet**
  - Cessna Citation X (C750)
  - Jet certificated as Stage 3, but that meets Stage 5
  - SEL 95
  - SEL 90
  - SEL 85
  - SEL 80

Scale in Statute Miles (1 mi = 5,280 ft)
Data obtained from Exelis “ADS-B ground-station” data feed

Of the 8,367 identified jet operations:
- An estimated 6,446 (77%) are certified as Stage 3
- An estimated 1,921 (23%) are certified as Stage 4

However, we estimate the great majority – 5,614 or 67% – actually meet the proposed Stage 5 standards
- 1,457 (17%) meet Stage 4 standards
- A small minority (1,307 or 16%) meet only Stage 3 standards.

Most aircraft are formally certified at a lower stage than they actually would achieve if certificated under today’s rules.

On an overall average basis, we estimate jets operating at APF in the first quarter of 2015 were 25 dB below Stage 3 standards – 8 dB below even the proposed Stage 5 standards!