Frequently Asked Questions – Aircraft Noise at JAC

Why does it seem aircraft no longer use the Visual Left Turn on Southern Departure?

Up until the 1990s, there was a higher use of “visual” procedures. In these visual procedures, a pilot did not have the benefit of a pre-defined track to avoid terrain, and instead they were given an option to accept responsibility for terrain clearance when there was good visibility. With advances in flight deck automation systems, and the increased set of options that come with an automation system that is constantly calculating back-up plans in the background, commercial flights are now expected to stay on routes that the flight deck automation can guide. This means less pilot discretion and more safety assurances, and less “visual” flying.

The FAA instituted a noise abatement left turn in the early 1980s. Due to terrain issues and updates to the FAA standards and procedures, this left turn procedure was eliminated approximately 20 years ago. In 2019 the Airport completed a 14 CFR Part 150 Study that recommended the implementation of the historic left turn or a similar procedure using NextGen technology.

In the past when pilots navigated mostly by tuning into ground-based electronic signals, pilots had to conservatively plan to factor in any variations in the signal. This meant flight paths were planned with 4-mile buffers on each side of the planned path. At times, especially in mountainous areas where the terrain limits the line of sight for electronic navigation signals, the available flight paths could be limited.

Up until the 1990s, that scenario set up conditions where pilots might elect to use “visual” procedures instead. In essence, they were saying, “I see the terrain, I will fly so as to safely climb above it.” In that way they could save time and fuel by going more directly to their destination.

However, as automation capabilities improved on board the aircraft, safety planners focused more and more on the abilities of a good automation plan to work in the background and to always calculate back-up plans for the pilot. As the flight progresses, the automation system now calculates thousands of back-up plans that are rarely used. It is always considering the aircraft weight, the winds, the distance from an airport, the

terrain, etc., to make sure that if there ever is an indicator to the pilot that something isn't right, the pilot immediately has good options to choose from.

While automation systems were improving, navigation technology was improving as well. GPS (Global Positioning System) and other forms of navigation now allow the pilot and the on-board automation system to know the precise location of the aircraft in more detail than was available in the 1980s.

The combination of flight deck automation and increased precision of navigation now means flight procedures are built to achieve the right balance of terrain clearance, energy/fuel efficiency, and operational back-up plans all the time. The safety balance of those concerns remains the same whether it is visual conditions or instrument conditions. Airlines typically train pilots to fly procedures where the automation is connected to the continuous planned track of the aircraft at all times and avoids the complicated transition from visual flight rules to instrument flight rules. This maximizes the efficiency and the decision-support tools available to the pilot.

The payoff for this approach is the incredible safety of U.S. aviation. In the 1980s and 1990s the aviation community liked to emphasize that air travel was the safest form of transportation, and it was. But the industry recognized a need to continually improve, and the safety levels of today have increased over an order of magnitude since the 1980s-1990s. The FAA standard is now "one in a billion." This means the goal of the system is to reduce the likelihood of a major accident to one in a billion flights. When arrival and departure procedures are being built, they are building not only well thought out paths to/from an airport, but they are also building safety into the system.

The 45 degree left turn on departure, for visual conditions, is encouraged in the Noise Abatement Plan. The Airport has no authority to require the use of the 45-degree left turn and it does not "require" either commercial service or general aviation aircraft to use the 45 degree left turn, although the turn is published on the Airport's website.

Does the Use Agreement limit the number of flights and how are the ADDs related?

The 1983 Use Agreement contains no limit on the number of flights. Rather, compatibility with the Park is measured by a single event noise limit, and two cumulative noise limits which apply to both commercial service and general aviation aircraft. The 2011 Amendment to the Use Agreement added an additional requirement, that the Board work to "reduce environmental impacts on the Park to the lowest practicable levels' consistent with safe and efficient Airport operations and applicable law. The formula by which noise is measured is public and is contained n the 1983 Agreement and in the Noise Abatement Rule adopted by the Board in 1985.

The Average Daily Departures (or ADD) limit is a mechanism adopted by the Board to enforce the cumulative noise limits and is contained in the Noise Abatement Plan which the Use Agreement required the Board to adopt pursuant to the completion of a FAR (now CFR) Part 150 Study. This ADD limit is based on equivalency with the noisier "base class" aircraft, which was operating at the Airport in 1985, which was the B-737-200-17 with JT8DQn engines. This limit on the number of commercial aircraft operations does not go into effect unless and until a cumulative noise limit has been reached. In fact, the ADDs are used to determine if the cumulative noise limits are close to being exceeded. As aircraft get quieter, the more operations are allowed to reach the "equivalent noise level" on one base class aircraft. In other words, it may take several newer quieter aircraft to achieve the same equivalent noise level as one base class aircraft.

How does noise monitoring differ from noise modeling?

In 1981, the Federal Aviation Administration (FAA) formally adopted the Day Night Average Sound Level (DNL) as the primary measure for determining exposure of individuals to airport noise. Day Night Average Sound Level is the annual, 24-hour average sound level, in decibels, obtained from the accumulation of all noise events, with the addition of 10 decibels to weighted sound levels from 10:00 P.M. to 7:00 A.M. The weighing of nighttime events accounts for the fact that noise events at night are more intrusive when ambient levels are lower, and people are trying to sleep. The 24-

hour DNL is annualized to reflect noise generated by aircraft operations for an entire year and is identified by “noise contours” showing levels of aircraft noise.

DNL is the most widely accepted descriptor for aviation noise because of the following characteristics: DNL is a measurable quantity; DNL can be used by airport planners and the public who are not familiar with acoustics or acoustical theory; DNL provides a simple method to compare the effectiveness of alternatives; and DNL is based on survey data regarding the reactions people have to noise.

The development of the DNL contours utilizes an FAA standard Aviation Environmental Design Tool (AEDT), which is updated frequently to account for current aircraft, operational considerations and modeling enhancements. Noise monitoring can help to validate the modeling through using actual data compared to the modeled information to ensure that the modeled noise is consistent with the actual measure on the ground noise. If noise monitoring shows that the average Airbus 320 results in a certain noise level at a specific point on the ground this can be compared to what the AEDT model predicts what noise level the same aircraft will make at the same point on the ground and the model adjusted accordingly.

What are the guidelines for compatibility for residences south of the Airport?

The 1983 Use Agreement required the Airport to adopt a noise abatement plan to assure compliance with Park noise standards, and also that the Airport “seek to ensure” that operations would be conducted so noise exposure would be “reasonably compatible” with other adjacent land uses. This is an aspirational goal but is not required by the Use Agreement. Congress gave FAA the authority to identify one aircraft noise metric, the threshold level to determine land use compatibility and to identify specific land uses that are noncompatible with the threshold noise level, which are contained in CFR Part 150. Per Part 150, noncompatible land use is defined as the existence of noise sensitive land uses (residential, houses of worship, schools, etc.) within the 65 DNL noise contour as generated by the Aviation Environmental Design Tool (AEDT) computer program. AEDT is the FAA’s official computer program for generating aircraft noise contours.

Like any other public airport in the United States, land use compatibility outside the Park is determined by utilizing guidelines contained in CFR Part 150, the FAA’s process for identifying land use compatibility associated with aircraft generated noise levels. The

Airport conducted such a Study subsequent to the Use Agreement and identified no noncompatible land uses within the 65 DNL noise contour. Since then, other Part 150 Studies have been conducted and again, no noncompatible land uses have been identified. In addition to the FAA official Part 150 Studies, the Airport generates an annual 65 DNL noise contour based on actual aircraft operations for the previous year to determine if any noncompatible land uses exist. To date, there have not been any noise sensitive land uses within the 65 DNL noise contours, therefore there are no noncompatible land use associated with aircraft operations at Jackson Hole Airport. If in the future, it is determined that a residence or more may be within the 65 DNL noise contour, that does not require the Airport to "shut down" or reroute aircraft arrival or departure routes. It means that the Airport may want to offer other means to mitigate the noise so that those residences are considered compatible. This could include sound insulation to lower inside noise levels, acquiring noise easements or outright property purchase.

The Airport Noise Abatement Plan implements a "single event standard of 92 dBA on approach." What does this mean?

The 92 dBA noise level discussed in the Airport Noise Abatement Plan refers to the certificated noise level of an aircraft on approach based on *14 CFR Part 36 Noise Standards: Aircraft Type and Airworthiness Certification* ("Part 36"). As a reminder, there is no federal standard for single event noise in communities. The Town Code and Airport Noise Abatement Plan prohibit operations by aircraft with certificated noise values greater than 92 dB on approach. A certificated noise level (i.e., 92 dB referenced in the Airport Noise Abatement Plan) is different than a single event noise measurement taken at someone's home or another location near an airport. Field measurements are not intended to duplicate or match certificated noise levels.

Every jet powered aircraft operating in the US has an "official" certificated noise level designated per the requirements of Part 36. Part 36 noise certification is a methodology developed by the FAA to quantify the relative noise levels of different aircraft types under identical controlled measurement conditions. The noise certification is based upon controlled measurements at a specific point on approach, a specific point on departure and a specific point to the side of the flight path. Aircraft are then certified as noise Stages 2, 3, 4 and 5 based upon this noise certification testing protocol. After 2018, all jet aircraft applying for a type certification, which is required to manufacture the aircraft, must meet Stage 5 noise levels.

The Airport Noise Abatement Plan references the certificated noise level on approach to restrict aircraft louder than the 737-200 from operating at the Airport.[1] This means an aircraft with a certificated noise level greater than 92 dBA on approach could not operate at the Airport. This does not mean that aircraft will not generate noise levels greater than 92 dBA at any point around an airport, as some certainly will. The noise will vary from location to location based upon distance from the airport, distance from the flight path, mode of operation, type of aircraft and operational conditions. The restriction means that aircraft certificated under Part 36 regulation that are louder than the 92 dBA on approach cannot operate at the Airport.

The Airport monitors compliance to ensure that aircraft with certificated noise levels greater than 92 dB on approach are not operating at the Airport. However, it is the case that aircraft operating at the Airport may generate noise levels greater than 92 dB, although the empirical data in the Annual Report reveals that this is rare at the monitoring sites.

Does the FAA have a maximum DNL noise threshold?

The FAA does not impose a maximum noise threshold using the DNL noise metric. The Use Agreement uses the Day Night Average Sound Level (DNL) to determine the annual average noise level at specific locations in the Park and the community. The DNL metric takes into account many factors including the number of operations and loudness of aircraft events. Further, events during the nighttime hours are weighted higher. The DNL metric is more sensitive to high noise events than it is to more operations that are quieter. Many of the new operations at the Airport are flown by newer generation aircraft that generate quieter events that balance the effect of an increase in operations.

The Use Agreement between the Park Service and Airport Board requires that the Airport Noise Abatement Plan “seek to ensure that airport operations are conducted in such a manner that aircraft noise exposure will be reasonably compatible with other adjacent land uses.” The Airport is in compliance with the Use Agreement.

[1] Note that the Use Agreement was drafted prior to the 1990 Airport Capacity and Noise Act (ANCA). Prior to 1990, airports could implement noise restrictions, subject to general legal principles. However, in 1990, Congress enacted ANCA, which severely constrained airports’ ability to impose new noise and access restrictions.