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memorandum

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to Part 150 Advisory Committee, OSU Airport FAR Part 150 Study

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subject Technical Analysis for Abatement Measures for Noise Compatibility Program

The second phase of a FAR Part 150 Study involves the development of the Noise Compatibility Program (NCP). Operational, land use, and administrative alternatives are reviewed to address noise concerns of the local communities with a primary focus of addressing the non-compatible land uses that exist within the 65 Day-Night Sound Level (DNL) contour at an airport. The contours developed for The Ohio State University Airport (OSU Airport) during the Noise Exposure Map (NEM) phase of the Study, determined the 65 DNL contour remains almost completely on Airport property for both the existing and future case scenarios and there are no non-compatible land uses within the 65 DNL contour. Knowing the local communities beyond the 65 DNL contours have noise concerns, the University is voluntarily proceeding with the NCP to review and attempt to address those concerns.

During the course of the Part 150 Study, the Reynolds Smith & Hills (RS&H) Team has solicited input and received feedback from residents in the vicinity of OSU Airport on concerns regarding operational noise, land use, and the administration of the Airport's in-house noise program. The RS&H Team reviewed the public comments, input from the Part 150 Advisory Committee, suggestions from OSU Airport, and industry best practices to identify specific measures that could be evaluated for potentially addressing each of the concerns identified. The measures to be reviewed were forwarded to the Part 150 Advisory Committee for comment on January 14, 2009. Comments were received from Committee members as well as members of the general public. These comments were reviewed and amendments were made to the list as appropriate. Many of the comments received were already contained on the list because each resident may describe his or her operational noise concerns in a unique way. In these instances, the list was not changed since the concern expressed by the commenter was already captured. Several comments recommended conclusions the commenter wanted to see come out of the Part 150 Study, rather than concerns or suggested abatement measures to be considered. These comments were not added to the list of measures to be reviewed, but will be considered when the final recommendations of the NCP are developed. The final list of measures is attached to this memo.

The NCP portion of the Part 150 Study process is divided into three categories: abatement (operational), mitigation (land use), and administrative. The review of concerns and any associated analysis of measures occurs in sequential order. The first step is to evaluate operational alternatives to determine what relief may be possible and if they can be implemented. Evaluation of the operational alternatives includes a review of each suggested measure for operational viability (airspace constraints, safety concerns, etc.) as well as a determination on whether or not the suggested alternative meets the previously established goals of the Part 150 Study for OSU Airport. Those suggested operational alternatives that meet these two criteria will receive further evaluation. This evaluation may include additional technical analysis that could include individual evaluation of the suggested

measure using the appropriate modeling techniques (single event contours, DNL contours, time-above analysis, etc.). Once this evaluation is complete, the proposed operational alternatives are combined to develop a comprehensive proposed DNL contour. The results of this contour are then used in the second step of the NCP process to determine which land use measures should be evaluated based on the non-compatible land uses that may be associated with the new proposed contour. Upon completion of the analysis of the land use alternatives, the administrative measures are reviewed in the third step of the NCP process to determine what measures will be needed to implement the operational and land use alternatives. The final step of the NCP process takes all proposed measures (operational, land use, and administrative) to form the recommendations for the NCP. The RS&H team is currently in the process of evaluating those measures that can move forward for further technical analysis and discussion. Because these operational measures will form the backbone of the NCP, this memo was developed to discuss those operational measures and to provide details on the technical issues associated with each operational measure. The land use and administrative measures will be analyzed following the completion of the operational alternatives and all analysis will be presented and discussed in the NCP document.

After receiving comments from the Part 150 Committee and general public on the list of potential concerns at the end of January 2009, the RS&H Team began the process of reviewing the operational concerns. The team identified what type of evaluation would be required, whether the proposed measures met study objectives, and if technical analysis was needed. The suggested measures that require further scrutiny will move on in the process to receive analysis, potentially including further technical analysis in the form of additional modeling, to determine if the suggested measures are technically and operationally feasible and would address the noise concern identified. In all cases, the suggested measures will be discussed in the NCP document including an explanation as to why some suggested measures did not move forward for additional analysis.

Central to this review was a meeting with air traffic control personnel from both Port Columbus International Airport and OSU Airport Air Traffic Control (ATC) Towers to discuss the operational coordination between the two facilities and the local airspace constraints that are created by the close proximity of the two airfields. Two key factors that were discussed during this meeting helped determine which of the suggested measures were viable from an airspace/air traffic safety standpoint and, therefore, suitable for further technical analysis, and which measures were not.

The first factor relates to the Class C airspace for Port Columbus International Airport that is both over the top of and just east of OSU Airport. The Class C airspace over OSU Airport extends from 2,500 feet Mean Sea Level (MSL) up to 4,800 feet MSL. The portion of the Class C airspace east of OSU Airport extends from the surface to 4,800 feet MSL. Any aircraft that penetrates this airspace must be in constant contact with ATC personnel at Port Columbus International Airport. The second factor relates to a corridor for departures from Port Columbus International Airport that exists east of State Route (SR) 315 above 3,000 feet MSL. Because of this corridor, and the fact that the two airports do not always operate in the same directional flow based on wind conditions (direction and speed) at the individual airports, all departures to the east and arrivals from the east into OSU Airport must have clearance from Port Columbus ATC personnel before entering this airspace to ensure that aircraft separation is maintained. It is important to note that the operations to and from the largest airport in any given airspace typically take precedence over other operations except in emergency situations. These two factors highlight the critical safety issues that must remain the top priority with air traffic control as mandated by the FAA. Protecting the safe operating environment of aircraft in flight will always supersede noise concerns. The list of suggested operational measures is presented below along with a brief discussion on whether additional analysis will be conducted, and if not, why that is the case.

Abatement (Airport and Aircraft Operational Measures)

As mentioned above, while each resident may describe his or her operational noise concerns in a unique way, virtually all concerns can be grouped within six overall categories: training activity, jet operations, helicopter operations, departure flight tracks, arrival flight tracks, and nighttime operations. In addition, the FAR Part 150

Study guidelines list several measures that are required for review in a Part 150 Study. All of these measures, which are listed below, are grouped according to each of the six categories, as well as the requirements of the Part 150 Study guidelines. The Ohio State University will decide which measures are recommended to the FAA for review and approval and will have responsibility for implementing the FAA-approved measures. The FAA has the responsibility for approving or disapproving the recommended measures in accordance with FAR Part 150. ***It is important to note that measures in bold italics represent potential noise and access restrictions regulated under FAR Part 161 and are not consistent with the goals established for the OSU Airport Part 150 Study.*** These measures will be discussed in the NCP document; however they will not be forwarded to the FAA as recommended measures.

Training Activity

- **Review pattern altitude to determine if a change would be beneficial.**
  The current pattern altitude is approximately 1,900 feet Mean Sea Level (MSL), resulting in a pattern altitude of approximately 1,000 feet above ground level (AGL); the airfield elevation is approximately 900 feet MSL. To achieve a noticeable reduction[1] in noise levels on the ground, the pattern altitude would need to be increased to approximately 2,900 feet MSL or 2,000 feet AGL which would result in an approximate six decibel reduction in noise on the ground. The Class C airspace for Port Columbus International Airport lies over the top of OSU Airport at 2,500 feet MSL. ATC personnel indicated all OSU Airport pattern altitudes would need to remain below the Class C airspace floor. The altitude increase needed to achieve a noticeable noise reduction on the ground would penetrate the Port Columbus International Airport Class C airspace and therefore is not possible. Incremental increases, up to the 1,000-foot increase discussed above, are not possible due to the narrow distance between the current pattern altitude and the Class C airspace altitude. These two airspace classifications are currently separated by an altitude buffer of 600 feet. ATC personnel stated it is necessary to keep that 600-foot buffer in place for safety, and therefore the training altitude should not be raised. Decreasing the 600-foot altitude buffer would increase the likelihood an aircraft in the training pattern would potentially encroach upon the Class C airspace. In addition, any increase in altitude less than 1,000 feet would not result in a noticeable change in noise level on the ground.

  An alternative approach is to have the training aircraft climb to pattern altitude prior to commencing any turns. Currently the pattern altitude is typically reached when aircraft are on the downwind portion of the pattern (flying parallel to the airfield). While this would not raise the pattern altitude, it would prevent the aircraft from continuing their climb through a turn potentially decreasing noise exposure on the ground. Establishing an altitude to achieve prior to commencing a turn versus asking the pilot to locate a landmark on the ground could also help to further fan the turning portion of the training pattern due to the different operating characteristics of the individual aircraft. Initial discussions with ATC have indicated that there may be practical and safety issues with aspects of this type of procedure, so the ability to recommend this procedure is not clear at this time. Additional review and analysis will be conducted to determine what benefits may be possible by having training aircraft climb to 1,000 feet AGL before commencing any turns and whether this procedure could be safely and effectively adopted.

- **Review pattern location to see if a different pattern would be beneficial, including staggering the downwind portion of the pattern.**
  A review of the radar flight track data for the current training pattern indicated a natural fanning of the operations already occurs due to pilot/controller techniques, wind/weather conditions, aircraft type, and other aircraft operating in the pattern or in the vicinity of OSU Airport. The pattern also changes (i.e., extends out farther) during warmer weather months due to weather conditions affecting the climb performance of the aircraft. Due to the location of the Class C airspace that overlies OSU Airport, and the

[1] FAA requires a five-decibel reduction for certain noise mitigation measures in recognition that a five-decibel reduction is noticeable to most people.

conflicting airspace east of OSU Airport, extending any portion of the pattern to the east is not possible. Therefore, no additional analysis on this suggested measure is warranted.

- **Review altering flight training tracks to avoid repeated, extended, and focused noise exposure over residential areas.**
  As mentioned previously, a natural fanning of the training pattern already occurs due to pilot/controller techniques, wind/weather conditions, and other aircraft operating in the pattern or in the vicinity of the Airport. A review of the flight tracks associated with training activity clearly demonstrates this variability and indicates the pattern is dispersed. To avoid simply shifting noise from one community to another, an area of compatible land use (e.g., an industrial corridor) would need to be identified to focus the training pattern over. To the north of the Airport, no compatible land use corridors exist that would work for concentrating the training pattern. SR 161/W. Dublin-Granville Road, located north of the Airport, is too close in proximity to the airfield to locate the complete downwind portion of the training pattern over it. Interstate 270 is located too far to the north, would cause the training pattern to be too large, would affect additional communities, and would cause potential conflicts with aircraft arriving or departing both OSU Airport and Columbus International Airport. In addition, if the north runway is extended, it is anticipated that most of the training activity will shift to the south runway. There may be some potential for improvements to the south of the Airport which is discussed below. No additional technical analysis will take place related to altering the training pattern to the north of OSU Airport.

- **Review Touch and Go prohibition hours to see if extending is possible (10:00 p.m. to 6:59:59 a.m. to align with FAA nighttime hours).**
  This will be discussed with OSU Airport and University Flight Education. This review and analysis will be discussed in the NCP document.

- **Review pilot training techniques for potential improvements.**
  This will be discussed with University Flight Education. This review and analysis will be discussed in the NCP document.

- **Review training pattern for south side of airfield for potential alignment with Bethel Road.**
  To the south of the Airport there is a commercial corridor along Bethel Road that may present an opportunity to center the downwind leg of the training pattern over this compatible land use. (Bethel Road is located farther away from the airfield than SR 161/W. Dublin-Granville Road is to the north.) Currently, training aircraft to the south of the Airport appear to follow Bethel Road to some extent, with the natural spreading of the tracks mentioned above. Additional technical analysis will be conducted to determine if it is possible to further concentrate the downwind leg of the south training pattern over Bethel Road, and if so, what benefits this may have.

- **Review portions of training fleet using different local airports for training activities.**
  Training aircraft from University Flight Education leave OSU Airport to train at other airports as appropriate. When training elsewhere is not required, it is far more efficient for the aircraft to remain in the pattern at OSU Airport. To mandate a certain amount of training activity must take place at other airports in the region would be considered an access restriction on the Airport, which is not consistent with the stated goals of this Part 150 Study. Therefore, no additional technical analysis will take place for this suggested measure.

Jet Operations

- **Review preferential runway system to determine if use of certain runways has more noise benefits, including rotational use of runways.**
  To a great extent, weather conditions, primarily wind speed and direction, dictate which runways are used at airports for arrivals and departures; aircraft design requires them to depart and land into the wind. In

addition to weather conditions, length of runway is crucial as well to ensure the aircraft has enough runway length to safely land or takeoff. The vast majority of operations at OSU Airport operate on the two parallel runways, Runway 9R/27L and Runway 9L/27R due to prevailing wind conditions and runway lengths. Because the Airport is primarily an east/west operating airport, rotational use of runways would only apply to east versus west. A technical analysis will be performed to determine which runway use combination would present the best scenario for exposing the fewest number of people when operating conditions permit.

- **Review use of Continuous Descent Approach (CDA) for Runways 9R/27L and 9L/27R.**
  The use of a CDA for arriving aircraft requires the aircraft to line up with the runway and begin their three-degree approach approximately more than 30 nautical miles from the airport. When a CDA is used, the noise benefits are generally experienced in an area about 10 to 15 nautical miles from the approach end of the runway. If CDAs were implemented at OSU Airport, the areas that would benefit from the use of a CDA are beyond those areas most affected by operations at OSU Airport. In addition, OSU Airport is in west flow approximately 70% of the time which would indicate the arrivals coming from the east would be the ones targeted for using the CDA. However, due to the proximity of Port Columbus International Airports Class C airspace, ATC personnel indicated implementation of a CDA for Runways 27L or 27R at OSU Airport would not be possible. No additional technical analysis is warranted for this suggested measure.

- **Review use of technology for approach assistance (Global Positioning System (GPS), Instrument Landing System (ILS), etc.). Technology may help pilots in maintaining consistent altitudes on approach.**
  Establishing a precision approach procedure for a runway end would provide precise vertical and lateral guidance and would allow aircraft to fly more consistent arrivals from an altitude and geographic location standpoint. It is important to note that when such a procedure is established, not all aircraft can utilize the precision procedure; aircraft must have the proper avionics in the cockpit to use the procedure. Currently, there is a precision instrument arrival procedure at OSU Airport for Runway 9R. Runway 9R has an Instrument Landing System (ILS) approach. While not technically classified as a precision approach, because altitude guidance is not provided, OSU Airport also has Global Positioning System (GPS) approaches for Runways 9R and 27L. This measure will be further explored to determine if establishing additional precision approach procedures would be possible at the Airport, and if so, determining if the additional precision approach procedures would potentially provide a noise benefit. This suggested measure will be explored and discussed in the text of the NCP document.

- **Review use of noise barriers and/or ground run-up enclosures to address noise from the use of reverse thrust, engine maintenance run-ups, and the use of APUs while on the ramp.**
  A noise barrier is an obstruction to the path of sound transmission. Barriers can include walls, earth mounds (or berms), buildings, or extremely dense vegetation. In the case of barriers, neighbors are shielded from the noise source (aircraft) as long as the barrier is close to the source or receiver (noise sensitive site), is solid and sufficiently breaks the line-of-sight from the noise source to the receiver. Barriers can potentially provide noise reduction benefits for residences immediately adjacent to an airport from aircraft ground operations. Once an aircraft becomes airborne and there is a direct line of sight from the aircraft to the receiver, barriers have no further effect on reducing sound levels.

  To be effective, a barrier needs to be very close to the source of noise and/or very close to the receiver. Examples of effective barriers are those used along interstate highways. That is, the barriers are close to the source and the receivers. With respect to aircraft, due to aircraft operational safety requirements, barriers cannot be constructed very close to the source (aircraft). In addition, by placing barriers close to the receiver, the distance from the source of noise at OSU Airport is so far that a barrier would be ineffective for ground based noise related to taxiing aircraft, aircraft using reverse thrust on landing, and

start-of-takeoff roll from aircraft departures. There are very few engine maintenance run-ups at OSU, and those that do occur are conducted in areas that are shielded from residential neighborhoods. Based on these two facts, engine maintenance run-ups are not considered a significant noise problem at OSU Airport. No additional technical analysis is required for this suggested measure.

- **Review use of noise barriers and/or ground run-up enclosures to address noise from taxiing aircraft.**
  See previous discussion related to noise barriers above. No additional technical analysis is required for this suggested measure.

- **Review policy regarding head-to-head operations (aircraft arriving and departing in the same direction), especially during the nighttime hours.**
  Community members have observed that aircraft during the nighttime hours have occasionally conducted what they refer to as head-to-head operations. This term at OSU Airport refers to an aircraft arriving on Runways 27L or 27R and later departing on Runways 9R or 9L and flying over the same communities as on arrival. OSU Airport personnel indicated this practice occurred in the past on an infrequent basis at night, but is discouraged now due to concerns about safety and noise. The pilot-in-command of an aircraft has the authority to request a certain runway for arrival or departure, and ATC personnel try and accommodate those requests when safety and operating conditions permit. During the nighttime hours, the OSU Airport ATC Tower is closed and traffic levels are much lower. Operating conditions are not as constraining as during the daytime hours. This suggested measure will be explored to determine ways to further discourage the use of head-to-head operations at OSU Airport during the nighttime hours. This suggested measure will be evaluated and discussed in the text of the NCP document.

- **Review Close-in versus Distant Noise Abatement Departure Profiles (NADP).**
  There are two different types of NADPs: Close-in Community and Distant Community. The Close-in Community NADP is intended to provide noise reduction for noise sensitive areas located in close proximity to the departure end of an airport runway. Noise reduction with this NADP is typically noticed within three to five miles from the departure end of the runway. The Distant Community NADP is intended to provide noise reduction for noise sensitive areas located more distant from the departure end of an airport runway. Noise reduction is typically noticed within five to eight miles from the departure end of the runway. Because the Airport is surrounded by noise sensitive uses, and there are no compatible use corridors over which the NADP could be flown, no additional technical analysis of specific Close-in or Distant NADPs will be performed with regard to this suggested measure. However, related quiet flying techniques will be the subject of additional analysis and will be discussed in the text of the NCP document.

- **Review pilot procedures on arrival and departures related to turns (i.e., reduced bank angle).**
  When an aircraft is turning, the bank angle determines the radius and length of the turn (i.e., the distance covered by the turn portion of the aircraft flight path). Aircraft cannot make a “flat” turn, where no bank angle is required, and will therefore always have some degree of bank angle. The bank angle of the turn is typically standard for an aircraft and is based on the operating performance of the aircraft as well as the comfort level of the occupants of the aircraft. The greater the bank angle in a turn, the more g forces (gravity exerted against the body) the occupants of the aircraft will experience, and the subsequent increase in the likelihood of becoming ill. It is often the perception of people on the ground that the increase in the bank angle of the turn causes more noise because the aircraft is applying more power to maintain lift. In reality, the power settings are not changed on the aircraft when a change in bank angle occurs. Power settings are determined by the phase of flight and changed if needed to maintain proper separation from other aircraft in the vicinity. Decreasing the bank angle of a turn, which would make the radius of the turn larger, would result in the flight pattern extending out to greater distances away from the Airport. While this may decrease the noise on the ground for the person that was located under the

original turn location, it will increase the noise for the person located under the new turn location because that location previously did not have the aircraft overflight.

In addition to considering the moving of noise from one location to another, there are other factors to consider as well. To the east of OSU Airport, there are airspace constraints that limit how far the flight patterns can extend due to conflicting air traffic with Port Columbus International Airport operations. Altering the arrival or departure bank angles for aircraft east of OSU Airport would extend the flight patterns significantly into Port Columbus airspace creating potential conflicts on a consistent basis. To the west of the Airport, the majority of jet aircraft typically depart straight out to the Scioto River before commencing any turns. This allows jet aircraft to gain altitude and subsequently lower the noise levels experienced on the ground.

Because of the airspace constraints and one of the goals of the Part 150 Study to not shift noise from one community to another, no additional technical analysis regarding bank angles is warranted.

- **Review jets that come in low and "hot" on a high powered approach dropping landing gear at low levels.**
  This suggested measure refers to the public's perception that some aircraft approach the Airport at a lower altitude and higher speed than what is considered typical. The configuration of an aircraft for approach is fairly consistent and based on checklists that pilots use to sequentially step through the procedures needed to prepare the aircraft for landing. The checklist covers the timing of flap deployment, the speed of the aircraft, and the deployment of the landing gear. While these procedures are similar in nature for all aircraft, they will vary in timing from aircraft to aircraft. In addition, aircraft approach speeds will vary from aircraft to aircraft. This suggested measure will be reviewed and discussed in the text of the NCP document with a focus on determining ways to encourage pilots and ATC personnel to have the aircraft follow quiet flying techniques when possible.

- ***Consider the establishment of a Noise Budget (allowance of noise for each operator).***
  Noise budgets are a noise and access restriction under FAR Part 161 and are not consistent with the goals established for the Part 150 Study. Therefore, analysis of the effects of a noise budget is not warranted.

Helicopter Operations

- **Review helicopter arrival and departure corridors to determine whether optimal locations are being used.**
  The current paths used by the helicopters operating at OSU Airport are the result of collaboration several years ago between ATC personnel and the helicopter operators to determine the best path locations into and out of OSU Airport from both an operational standpoint and a way to reduce helicopter noise exposure over noise sensitive land uses. The vast majority of the helicopters departing OSU Airport are operations related to medical emergencies. Their final destination varies greatly based on where the medical emergency is located and flight paths are dictated by the quickest path to reach the destination. The majority of the arrivals come from south and east of OSU Airport where several medical centers are located. Due to the time sensitive nature of the departure operations, only the arrival paths were reviewed for potential changes.

  As mentioned previously, the majority of the helicopter arrivals occur from south and east of the Airport. The procedure directs the helicopters to proceed to the north following SR 315 and report to ATC when crossing Bethel Road. The helicopters are then directed to proceed direct to the intersection of Godown and West Case Roads. This procedure keeps the helicopters over SR 315 as long as possible, which lessens the noise exposure on residents. The transition from SR 315 to the airfield must cross over residential areas because no corridor of compatible land use exists in this area. Without a corridor of

compatible land uses to fly over, no alternatives exist for new helicopter procedures. Therefore, no additional technical analysis is warranted for this suggested measure.

- **Review helicopter published procedures.**
  The published procedures will be reviewed and suggestions for clarifying the procedures will be discussed in the text of the NCP document.

- **Review helicopter altitudes for arrivals and departures.**
  As mentioned previously, ATC personnel and the helicopter operators worked together collaboratively several years ago to establish the best arrival and departure routes for OSU Airport. Part of that discussion focused on the altitude of the helicopter operations that would help reduce noise exposure and would ensure proper separation from other air traffic including fixed wing aircraft. Because safety is the first priority, no alternatives exist to make adjustments to the helicopter altitudes beyond the measures already undertaken. No additional technical analysis is warranted for this suggested measure.

Departure Flight Tracks

- **Review pilot procedures for propeller aircraft related to propeller power and pitch settings.**
  Propeller power and pitch settings are chosen based on the operating needs of an aircraft at that point in its flight. The correct settings are crucial for ensuring the aircraft achieves the appropriate thrust for safe flight. There are instances where the power and pitch settings can be adjusted to reduce noise without affecting the safe performance of the aircraft. These techniques will be reviewed and the NCP document will discuss those instances where the pitch can be safely adjusted and will encourage pilots to use reduced power and pitch settings to reduce the noise exposure on the ground. Since the pilot-in-command has final decision on safe operation of his or her aircraft, it is not possible to mandate the use of reduced power and pitch settings at OSU Airport. This suggested measure will be addressed in the text of the NCP document.

- **Review use of SR 315 for routing of departures to the north and east**.
  As mentioned previously, there is a departure corridor for aircraft operating from Port Columbus International Airport that exists to the east of SR 315. Aircraft departing OSU Airport to the east with destinations north and east of OSU Airport must coordinate with ATC personnel at Port Columbus International Airport to ensure no aircraft conflicts occur. To achieve this, some flexibility is required to allow ATC personnel to safely maintain aircraft separation. Concentrating the departures to the north and east over SR 315 would remove this flexibility and present more instances for potential conflicts with air traffic operations for Port Columbus International Airport, potentially resulting in a compromise to safety. Therefore, no additional technical analysis is warranted for this suggested measure.

- **Review use of Area Navigation (RNAV) overlay procedures.**
  RNAV procedures can be beneficial if a compatible land use corridor is identified and a desire to concentrate operations over that corridor can be achieved. Because of noise sensitive land uses surround the Airport on all four sides; no compatible land-use corridors exist for arrivals and/or departures that would warrant the establishment of an RNAV procedure for noise abatement purposes. Therefore, no additional technical analysis is warranted for this suggested measure.

- **Review departure headings to determine if optimal path is being used for noise abatement that meets Air Traffic Control (ATC) operational and safety requirements, including location of turns and angle of bank for turns.**
  As mentioned previously, the Class C airspace of Port Columbus International Airport dictates the current departure procedures for the safe separation of OSU Airport and Port Columbus International Airport aircraft operations. The current 050 degree heading turn has been a focus of community concern. ATC personnel for Port Columbus International Airport have confirmed that a turn to the north of the runway

heading must remain in place as a departure procedure to avoid conflicts with aircraft operating to and from Port Columbus International Airport. While the Class C airspace prevents aircraft from departing on a heading greater than 050 degrees, a technical analysis will be conducted on the departure headings less than 050 degrees to determine if there is a more beneficial heading from a noise standpoint when conditions permit.

- **Include review of eliminating the 050 degree heading turn for all eastbound departures.**
  As mentioned above, the complete elimination of the northerly turn for eastbound departures is not possible due to the need to maintain separation from the Port Columbus International Airport air traffic. No additional technical analysis will take place on eliminating the northerly turn.
- **Include review of eliminating the 050 degree heading turn for high performance aircraft.**
  As mentioned above, the elimination of the northerly turn for eastbound departures is not possible due to the need to maintain separation from the Port Columbus International Airport air traffic. No additional technical analysis is warranted on this suggested measure.
- **Include review of straight out departures with the 050 degree heading turn to occur over Interstate 71 for all eastbound departures.**
  Discussions with ATC personnel at Port Columbus International Airport indicated that delaying the turn onto the 050 heading until reaching Interstate 71 would place the departing aircraft from OSU Airport into Port Columbus International Airport airspace and raise the potential for air traffic conflicts. This would compromise safety. Therefore, no additional technical analysis is warranted on this suggested measure.
- **Include review for departures to the west to fly straight till reaching the river or Interstate 270 before turning.**
  Based on discussions with ATC personnel at both OSU Airport and Port Columbus International Airport, it was determined the current departure procedure for aircraft to the west calls for the aircraft to fly straight to the Scioto River prior to commencing any turns. While not all aircraft may follow this procedure on a consistent basis, an analysis of the operations reveals that a majority of the aircraft do. Methods to encourage more consistent following of this procedure will be explored and discussed in the text of the NCP document.

- **Review use of a scatter/fan pattern for departures to the east.**
  A review of the current flight tracks for departures to the east reveals that a scatter/fan pattern already exists, especially to the north and east. There are virtually no departures to the south and southeast of OSU Airport due to potential air traffic conflicts with Port Columbus International Airport aircraft operations. Port Columbus International Airport ATC personnel indicated that the prohibition of departures from Runways 9R/L from turning to the southeast of OSU Airport must remain in place to maintain air traffic separation. No additional technical analysis is required on this suggested measure.

- **Review any altitude restrictions for eastbound and westbound departures.**
  The discussions with OSU Airport and Port Columbus International Airport ATC personnel indicated that altitude restrictions are rarely used for aircraft departing OSU Airport. The current procedure calls for aircraft to depart and climb to 3,000 feet MSL and hold until given further clearance by Port Columbus Terminal Radar Approach Control (TRACON). The hold occurs less than five percent of the time according to ATC personnel, from both OSU Airport and Port Columbus International Airport, and only occurs if needed for conflicting air traffic to or from Port Columbus International Airport. Most aircraft departures are not held at 3,000 MSL, but rather given clearance to continue climbing prior to reaching 3,000 foot MSL. ATC personnel indicated the limit of 3,000 feet MSL must remain as it is today to allow for flexibility in separating aircraft operations. No additional technical analysis is required on this suggested measure.

Arrival Flight Tracks

- **Review pilot procedures for propeller aircraft related to propeller power and pitch settings.**
  As described above, propeller power and pitch settings are chosen based on the operating needs of an aircraft at that point in its flight. The correct settings are crucial for ensuring the aircraft achieves the appropriate thrust for safe flight. Since the pilot-in-command has final decision on safe operation of his or her aircraft, it is not possible to mandate the use of reduced power and pitch settings at OSU Airport. However, there are instances where the power and pitch settings can be adjusted to reduce noise without affecting the safe performance of the aircraft. The text of the NCP document will discuss those instances when the pitch can be adjusted and encourage pilots to use reduced power and pitch settings to reduce the noise exposure on the ground.

- **Review side-step approach to Runway 27R having aircraft follow SR 161/W Dublin Granville Road for as long as possible.**
  A side-step approach is often considered at airports to use a compatible land use corridor that may not line up exactly with a runway. Aircraft will follow the approach over a compatible land use corridor to the side of the extended centerline of the runway and then "side step" to line up with the runway two to three miles from the landing threshold. This was suggested as a potential noise abatement alternative for OSU Airport for arrivals to an extended Runway 27R by making use of SR 161/W Dublin Granville Road. ATC personnel discussed this and concluded that this type of procedure would create safety concerns because the side-step portion of the approach would be almost directly facing an aircraft if it were to be in the training pattern on the north runway and the need to turn from the side-step approach to the runway would occur during a critical phase of aircraft flight subjecting the aircraft to additional safety risk. Safety would be compromised with this suggested measure. In addition, the potential benefits of such a procedure would occur several miles away from OSU Airport and provide no benefit to those communities concerned with aircraft arrivals. Therefore, no additional technical analysis is warranted on this suggested measure.

- **Review use of SR 315 for routing of arrivals from the north and east.**
  As mentioned previously, ATC personnel at Port Columbus International Airport identified airspace conflicts with aircraft operating to and from Port Columbus International Airport east of OSU Airport over SR 315. The current procedures allow for some flexibility in allowing ATC personnel from Port Columbus International Airport to safely separate aircraft operating at the two airports. Concentrating the arrivals from the east and north over SR 315 would take away some of ATC's options and would present a safety concern. No additional technical analysis is required on this suggested measure.

- **Review use of RNAV overlay procedures.**
  RNAV procedures can be beneficial if a compatible land use corridor is identified and a concentration of operations over that corridor can be safely achieved. Because noise sensitive land uses surround OSU Airport on all four sides, no compatible land-use corridor exists that would warrant the establishment of an RNAV procedure for noise abatement purposes. Therefore, no additional technical analysis will take place on this suggested measure.

- **Review arrival procedures to determine if optimal path is being used for noise abatement that meets ATC operational and safety requirements, including location of turns and angle of bank for turns.**
  As mentioned previously, airspace conflicts exist east of OSU Airport which makes the current arrival procedures necessary for safety reasons. While no changes can be made to the existing arrival procedures from the east, additional technical analysis will be conducted on the existing arrival headings to determine if one is more beneficial for use from a noise standpoint when conditions permit. If a safe, noise-beneficial arrival heading is found, that heading could be identified as the preferred heading to use by ATC personnel and pilots when conditions permit.

- **Consider published visual approach procedures.**
  Prior to flying to an airport, pilots review the published arrival procedures for that airport. Instrument arrival procedures are published for use by pilots during inclement weather conditions, or when an Instrument Flight Rules (IFR) flight plan has been filed. IFR arrival procedures provide specifics to the pilot on location of their aircraft, where turns should occur, and what altitude the aircraft should be flying at a particular point along the arrival flight path. When visual approach procedures are used, the pilot primarily uses references seen out the window of the aircraft to guide them into the airport. This results in a lot of discretion given to the pilot regarding location and altitude of the aircraft. This proposed measure will explore the possibility of publishing visual approach procedures for OSU Airport that would potentially identify and avoid the noise sensitive areas around OSU Airport. A technical analysis will be performed if needed.

Nighttime Operations

- **Review preferred runway use program at night.**
  Weather conditions, primarily wind speed and direction, dictate which runways are used at airports for arrivals and departures; aircraft design requires that the aircraft depart and land into the wind. In addition to weather conditions, length of runway is crucial as well to ensure the aircraft has enough runway length to safely land or takeoff. The vast majority of operations at OSU Airport operate on the two parallel runways, Runway 9R/27L and Runway 9L/27R due to prevailing wind conditions and runway lengths. A technical analysis will be done to determine which nighttime runway use combination would present the best scenario for exposing the least amount of people to aircraft noise when operating conditions permit.

- **Review head-to-head operations at night for possible prohibition or discouragement.**
  As described above, community members have observed that aircraft during the nighttime hours have occasionally conducted what citizens refer to as head-to-head operations. At OSU Airport, this term refers to an aircraft arriving on Runways 27L or 27R and later departing on Runways 9R or 9L and flying over the same communities as on arrival. OSU Airport personnel indicated this practice occurred in the past on an infrequent basis at night, but is discouraged now due to concerns about noise and safety. The pilot-in-command of an aircraft has the authority to request a certain runway for arrival or departure, and ATC personnel try and accommodate those requests when safety and operating conditions permit. During the nighttime hours, the OSU Airport ATC Tower is closed and traffic levels are much lower. Operating conditions are not as constrained as during the daytime hours. This suggested measure will be explored further and discussed in the text of the NCP document to determine ways to further discourage the use of head-to-head operations at OSU Airport during the nighttime hours.

- **Review departure paths for nighttime operations.**
  During the nighttime hours, the amount of air traffic decreases significantly for both OSU Airport and Port Columbus International Airport. With the decrease in the amount of air traffic, air traffic conflicts become less of a possibility. Taking this into account, a technical analysis will be performed to determine if a departure path could be used, when conditions permit, for the departures that occur during the nighttime hours to reduce the noise exposure on the local residents.

- **Review arrival paths for nighttime operations**.
  As mentioned previously, the decrease in air traffic during the nighttime hours often presents opportunities for specific operating procedures due to the lower likelihood of air traffic conflicts. Because of this, a technical analysis will be performed to determine if an arrival path could be used, when conditions permit, for the arrivals that occur during the nighttime hours to reduce the aircraft noise exposure on the local residents.

FAR Part 150 Required Measures for Review

- ***Review curfews.***
  Mandatory curfews are considered noise and access restriction under FAR Part 161, are not consistent with the goals established for the Part 150 Study, and will not be analyzed.

- ***Review noise related landing fees.***
  Noise-related landing fees are considered potential noise and access restrictions under FAR Part 161, are not consistent with the goals established for the Part 150 Study, and will not be analyzed.

- ***Review limits on the number of operations.***
  Limits on the numbers of aircraft operations are noise and access restrictions under FAR Part 161, are not consistent with the goals established for the Part 150 Study, and will not be analyzed.

- ***Review limits on the types of aircraft operations.***
  Limiting certain types of aircraft from operations at the Airport is discriminatory, is a noise and access restriction under FAR Part 161, is not consistent with the goals established for the Part 150 Study, and will not be analyzed.

Other

- **Review ground run-up or taxi restrictions.**
  Many airports establish procedures for aircraft ground operations to reduce noise exposure for surrounding areas. OSU Airport has an established noise abatement program that also addresses these noise concerns. The program includes a prohibition on engine maintenance run-ups during the nighttime hours, limits on use of auxiliary power units, and a request to use minimum reverse thrust on landing when conditions permit. For this suggested measure, the current noise abatement programs related to ground-based noise will be reviewed to determine if additional measures should be established to reduce the potential noise exposure in noise sensitive areas adjacent to OSU Airport. In addition, the methods used to disseminate information on these programs will also be reviewed for areas where improvement may be possible. This additional review will be discussed in the text of the NCP document.

- ***Review maximum aircraft noise restriction.***
  Setting maximum aircraft noise levels is a noise and access restriction under FAR Part 161 is not consistent with the goals established for the Part 150 Study, and will not be analyzed.

- ***Review Part 36 aircraft noise limits.***
  Using FAR Part 36 to limit the types of aircraft using the airport is a noise and access restriction under FAR Part 161,is not consistent with the goals established for the Part 150 Study, and will not be analyzed.

- **Review all noise abatement guidelines published by the Airport.**
  To address the noise concerns of nearby residents, OSU Airport has established a noise abatement program. The program includes: a “Please Fly Neighborly” program for pilots; traffic pattern altitudes; engine maintenance run-up procedures; and voluntary curfews on Stage 2 jets, auxiliary power unit usage, touch and go operations, and low practice approaches. For this suggested measure, the noise abatement program will be reviewed and changes suggested where appropriate to continue progress on reducing the noise exposure on surrounding communities. In addition, the methods used to disseminate information on these programs will also be reviewed for areas where improvement may be possible. This additional measure will be addressed in the text of the NCP document.