

MEMORANDUM

DATE January 12, 1984

TO Technical Working Committee

FROM Jody Yamanaka, Project Manager *JY*

SUBJECT Meeting Notice and Distribution of Working Paper
Airport Noise Remedy Update--Jackson International Airport

The next Technical Working Committee Meeting will be held on Wednesday, January 25, 1984, in the Airport Administration Conference Room on the Third Floor of the Airport Terminal Building at 4:00 p.m. The agenda will include a review of the proposed criteria and boundaries for land acquisition, purchase assurance and sound insulation programs, a presentation of the recommendations for changes/additions to the criteria and boundaries made by the Technical Working Committee's subcommittee on noise remedy program boundaries, and a review of the proposed "on-airport" noise abatement measures.

In advance of the January 25 meeting, a copy of the "on-airport" component of the "Final Evaluation" working paper is attached for your review. As with the "off-airport" component of the working paper, comments should be received by me no later than January 31, 1984.

Notice of the next set of neighborhood workshops (January 23 and 24, 1984) will be sent to all those persons on the Update's Mailing List. Should you need additional copies of this notice, please give either me (382-3327) or Ms. Janet Bowlin (382-3320) a call.

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Attachment

Distribution:

Technical Working Committee: Berwald, Black, Bohrer, Bray, Carver, Conradi, Dana, Dinwiddie, Dodds, Drury, Gestner, Hall, Hamilton, Holstine, Horner, Jhaveri, Johnson, Kos, Kumasaka, D. Legg, R. Legg, Nelson, Petterson, D. Robertson, Rus, Russell, Secrist, Shride, Simpson, Strander, Trantum, Vinton, Wing, Zalud

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Peat Marwick: Doyle, Maddison, Bowlin

Others: Bacalzo, Bowen, Brown, Collins, Jennings, Neilson, Peart, Phillips, Sheets

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Chapter 5

FINAL EVALUATION OF NOISE ABATEMENT AND NOISE REMEDY MEASURES

INTRODUCTION

As a result of the initial evaluation described in Chapter 4, certain noise abatement and noise remedy measures were eliminated from further consideration (see Tables 4.1 and 4.2). In this chapter, the various measures that were considered for further evaluation in Chapter 4 are analyzed with respect to their specific applicability at Sea-Tac (now Jackson) International Airport. Those measures recommended for implementation are also identified.

As previously noted, airport-oriented noise improvements may be divided into two categories:

- On-airport noise abatement measures
- Off-airport noise mitigation or noise remedy measures

The following 10 criteria were used in developing the final evaluation of noise measures described in this chapter:

1. Compatibility with the operation of Jackson and its associated airspace. This criterion relates primarily to the on-airport noise abatement measures. The measures to be included in the program should, at a minimum, not negatively affect the operation of Jackson International and its associated airspace; whenever possible the operation should be improved.
2. Aircraft operational safety considerations. This criterion also relates primarily to the on-airport noise abatement measures. The measures to be included in the program should not impair the safe operation of aircraft.

3. Aircraft noise reduction. This criterion relates directly to the on-airport noise abatement measures. The measures to be included in the program should provide for some noise reduction in the Airport environs.
4. Reduction of incompatible land uses and the related number of people exposed to adverse aircraft noise levels. This criterion is related to remedy measures that can convert an existing incompatible use into a compatible use or can be applied to ensure that future noise-sensitive uses are not developed in areas exposed to high levels of aircraft noise. Therefore, the measures to be included in the program should mitigate noise effects or reduce future incompatible land uses in the Airport environs.
5. Social and induced socioeconomic impacts. This criterion relates primarily to off-airport noise remedy measures. Measures to be included in the program should not have social or induced socioeconomic impacts on the Airport environs.
6. Community attitudes and opinions. This criterion relates to both on-airport and off-airport measures. Measures to be included in the program should be consistent with community attitudes and opinion.
7. Relationship to existing plans. This criterion relates to both on-airport and off-airport measures. To the extent possible, measures to be included in the program should be compatible with the Sea-Tac/Communities Plan and other planning documents and guidelines pertinent to the Airport environs.
8. Program and/or unit costs. This criterion relates to both on-airport and off-airport measures. The measures to be included in the program should not impose an undue cost burden on either the aviation community or the public in the Airport environs.

9. Economic and financial feasibility of implementation. This criterion relates to both on-airport and off-airport measures. To include a measure in the program, implementation of the measure should be both economically and financially feasible.
10. Timing of implementation action(s). This criterion relates to both on-airport and off-airport measures. Although time is of the essence, the implementation of measures included in the program should recognize and be compatible with other plans and programs affecting the Airport and its environs.

EVALUATION OF ON-AIRPORT NOISE ABATEMENT MEASURES

Final evaluation of the on-airport noise abatement measures described in Chapter 4 is summarized in Table 5-1 and is presented in the following text.

1. Indicate a displaced threshold or construct a runway extension. As stated in Chapter 4, additional displaced thresholds or the construction of runway extensions would not reduce off-Airport noise exposure. Rather, noise exposure would be shifted from areas to the north to areas to the south, or vice versa.

A member of the Technical Working Committee proposed that jet aircraft departing Runway 34R should be required to use the full length of the runway rather than departing from the intersection with Taxiway A-8. The incidence of aircraft departing Runway 34R is somewhat limited because the instrument landing system (ILS) is located on this runway and therefore it is preferred that this runway be used for landing in a north traffic flow. Accordingly, aircraft departing Runway 34R at the intersection with Taxiway A-8 do so during periods of low arrival demand. There are times when aircraft do use the full length of Runway 34R (11,899 feet) for departure because of takeoff runway length requirements dictated by the weight of the aircraft.

Table 5-1

FINAL EVALUATION OF ON-AIRPORT NOISE ABATEMENT MEASURES
Jackson International Airport Noise Remedy Program Update

Noise Abatement Measure	Criteria: ^a Would the measure . . .										Recommendation
	1. Be compatible with the operation of Jackson?	2. Impair the safe operation of aircraft?	3. Reduce aircraft noise?	4. Reduce incompatible land uses? ^b	5. Have social or induced socioeconomic impacts?	6. Be consistent with community attitudes and opinions?	7. Be compatible with existing plans?	8. Impose undue cost burden?	9. Be economically and financially feasible?	10. Be timely with respect to other plans and programs?	
1. Indicate a displaced threshold or construct a runway extension.	Yes	No	No	No	No	Yes	Yes	No	Yes	Yes	1. Continue existing procedures; no construction. ^c
2. Establish noise abatement procedures for helicopters.	Yes	No	Possibly	No	No	Yes	Yes	No	Yes	Yes	2. Continue existing procedures; monitor growth in activity. ^c
3. Relocate engine run-up areas, restrict run-up times, or change run-up procedures.	Yes	No	Possibly	No	No	Yes	Yes	No	Yes	Yes	3. Port has extended run-up curfew. ^c
4. Implement preferential runway use procedures.	Yes	No	Possibly	No	No	Yes	Yes	No	Yes	Yes	4. Continue existing procedures. ^c
5. Impose curfews.	Yes	No	Possibly	No	Possibly	Yes	Yes	Possibly	Possibly	Yes	5. Total curfew not legally feasible but explore limited rescheduling of nighttime flights.
6. Restrict training flights.	Yes	No	Possibly	No	No	Yes	Yes	No	Yes	Yes	6. Eliminate existing (minimal activity) training flights.
7. Change takeoff, climb-out, or landing procedures.	Yes	Possibly	Possibly	No	No	Yes	Yes	No	Yes	Yes	7. New procedures being developed.
8. Change approach and departure flight patterns.	Yes	Possibly	Possibly	No	No	Yes	Yes	Possibly	Yes	Yes	8. No change recommended; follow existing procedures. ^c
9. Construct noise barriers or berms.	Yes	Possibly	Possibly	No	No	Possibly	Yes	No	Yes	Yes	9. Topography essentially precludes use of barriers or berms.
10. Expand noise monitoring system.	Yes	No	Limited ^d	No	No	Yes	Yes	No	Yes	Yes	10. Expand existing system to include two additional monitors. ^c
11. Maintain noise abatement staff.	Yes	No	Limited ^d	No	No	Yes	Yes	No	Yes	Yes	11. Continue with existing staffing; expand as necessary. ^c
12. Establish noise abatement committees.	Yes	No	Limited ^d	No	No	Yes	Yes	No	Yes	Yes	12. Establish noise abatement task force.
13. Use facilities siting as buffer.	Yes	No	Possibly	No	No	Yes	Yes	No	Yes	Yes	13. New buildings to act as noise buffers.
14. Restrict ground movement of aircraft.	Yes	No	Possibly	No	No	Yes	Yes	No	Yes	Yes	14. Towing of aircraft to/from maintenance areas during nighttime.
15. Comply with FAR Part 36.	Yes	No	Limited ^e	No	No	Yes	Yes	No	Yes	Yes	15. Support compliance with FAR Part 36 requirements.
16. Impose noise-related landing fees.	Yes	No	Possibly	No	No	Yes	Yes	No	Yes	Yes	16. Do not pursue because of legal implications.

a. The criteria are defined in the text beginning on page 5-1.

b. This criterion only applies to off-airport noise remedy measures.

c. Measure already partially or fully implemented.

d. Could reduce noise only to the extent that the measure serves to monitor the effectiveness of or helps in enforcing other noise measures.

e. Limited in the amount of time the measure would be in effect.

Source: Peat Marwick, January 1984.

If this proposal were implemented, it would have the same effect as a runway extension of about 2,500 feet. Thus, areas south of the Airport would be subject to increased noise exposure (the aircraft would be 2,500 feet closer), while areas north of the Airport would experience a reduction in noise exposure (the aircraft would be about 200 to 300 feet higher). From an operational viewpoint, the aircraft would have to taxi an additional 2,500 feet while fully loaded if using the full length of the runway for takeoff.

With these considerations in mind, it is recommended that the existing condition of intersection takeoffs be continued and no new procedures implemented.

2. Establish Noise abatement procedures for helicopters. The present level of helicopter activity at Jackson International Airport is extremely low. The number of helicopter operations at the Airport (840 per year) is about 0.3% of total operations, and these have an insignificant environmental effect on the areas around the Airport.

If the number of helicopter operations increases significantly (as a percentage of total operations), altitude restrictions or preferred routes could be established. However, current air traffic control procedures are adequate, and additional restrictions are not necessary. Therefore, none are recommended.

3. Relocate engine run-up-areas, restrict run-up times, or change run-up procedures. The Port has designated curfew times and specific areas on Taxiway A to be used for engine run-up activities; the location to be used at a specific time is determined by wind conditions. At the north end, the run-up area is on Taxiway A on the South 160th Street alignment; at the south end, the run-up area is on Taxiway A on the South 188th Street alignment. Several factors have to be considered in selecting locations for run-up areas. From an operational viewpoint,

the run-up areas should be located such that the aircraft does not interfere with movements on the active runways and taxiways. From an environmental viewpoint, the run-up areas should be located as far away as possible from any adjacent noise-sensitive uses, and to the extent possible, use should be made of on-airport structures to attenuate the noise. The locations currently in use at the Airport are satisfactory in these regards.

A survey conducted from September 20 through October 8, 1982, showed that a total of seven aircraft engine run-ups occurred. Of these seven run-ups, only two occurred after 10 p.m. or before 7 a.m.

Recently, a Port proposal was considered to extend the aircraft engine run-up curfew between 10 p.m. and 7 a.m., except needed run-ups between 6:00 a.m. and 7:00 a.m. if directly related to flight operations. An amendment to the Airport rules and regulations pertaining to the extension of the run-up curfew was approved by the Port Commission on November 22, 1983.

4. Implement preferential runway use procedures. Preferential runway use procedures normally involve the use of specific runways to reduce overflights of noise-sensitive areas. Preferential runway use can also include an effort to maximize or restrict the use of specific runways by class and type of aircraft in order to reduce aircraft noise exposure. However, because of the orientation of the runways at the Airport, the location of the ILS, as well as prevailing wind conditions, little can be done with runway use procedures to minimize noise exposure further. FAA Tower Order SEA TWR 7110.0710, Noise Abatement Procedures, specifies that the preferred takeoff runway for a south flow is Runway 16L and the preferred landing runway for a north flow is Runway 34R.

The preferential runway use procedure already in effect under the Tower Order relates more to approach and departure profiles and flight tracks and is addressed in this chapter under paragraphs 7 and 8.

5. Impose curfews. Review of the most relevant judicial decisions on aircraft noise litigation indicates that the courts continue to hold the airport proprietor liable for damages resulting from aircraft noise. As a result of this potential liability, airport proprietors are attempting to implement airport use restrictions to decrease objectionable noise levels and avoid a possible lawsuit. Although the airport proprietor has an economic incentive to abate noise levels, the necessary authority to achieve this goal is limited by the federal plenary powers in interstate commerce and navigable airspace.

One of the most recent decisions relating to this subject concerns the nighttime flight curfew at Westchester County Airport, New York. The county had set a midnight to 7 a.m. ban on non-emergency flight operations in 1981, in response to citizen complaints on noise. The ruling judge stated that the attempt to control noise with the curfew is beyond the county's authority. Local airport proprietors can only set "reasonable, non-arbitrary and non-discriminatory" noise level regulations, he noted. The curfew banned all planes at night regardless of noise emitted, so it is an "unreasonable, arbitrary, discriminatory, and overbroad exercise of power by the county," the court said.

Moreover, the curfew interferes with air traffic control, an intrusion upon federal responsibility. Westchester is one of five major New York metropolitan area airports, handling about a third of New York's general aviation operations. Traffic from Westchester has to be integrated with that of other airports in the region, especially with LaGuardia Airport. By delaying Westchester flights until the peak morning hours, the curfew causes delays not only at Westchester but also at other airports.

The judge also ruled that Westchester must keep the airport "open and available at all times" under grant agreements between the FAA and the county. The FAA refused further grant-in-aid funds to the airport last May because of the curfew. Westchester has received a total of \$4.45 million since 1970. A final order banning the nighttime flight curfew was signed in September 1983 in the Federal Court for the Southern District of New York.

Another legal battle relating to curfews that was settled recently concerned noise level restrictions at Santa Monica Airport, California. The City of Santa Monica, California, and several aviation groups reached agreement on a way to resolve their legal battle over the restrictions at the Airport and filed a joint motion to dismiss their litigation in January 1983.

The agreement reached between the city and the aviation groups ends a five-year long legal battle over use of the airport that began in 1978 when the City of Santa Monica enacted ordinances to control aircraft noise at the city airport. These ordinances banned jet aircraft from using the airport and imposed fines on jets landing and taking off, prohibited nighttime takeoffs and landings, banned low approaches on weekends, and prohibited helicopter flight training. The city also enacted a 100 dB single-event noise exposure level limit for aircraft using the airport.

Under the terms of the agreement, Santa Monica rescinded its 85 dB aircraft noise limit and reimposed the 100 dB SENEL. The city has agreed to keep the airport open until June 1, 2015, if given "satisfactory assurances" that its environmental goals can be met. It further agreed not to recommend enactment of any noise ordinance that excludes all jet aircraft from the airport or accomplishes objectives other than "reasonable noise regulation."

In addition to affecting passenger service, curfews can also significantly affect the air freight industry. Freighters operate primarily out of large airports. Their pattern of operation is such that curfews at nearly any airport in the freighter system could cause serious service disruptions.

It is not possible to predict what specific service adjustments might take place in response to curfews because of the sensitivity of operations to the requirements of certain groups of key customers and to the particulars of network structure and routing. However, the likely result of even moderate levels of curfews at airports served by scheduled freighters would be very substantial service and revenue losses, perhaps to the extent that most domestic dedicated freighter service would no longer be profitable. There would be far fewer desirable departure times, broken connections, serious crew scheduling problems, requirements for additional aircraft, and large losses in demand.

The problems for the air freight industry would be substantially more severe than those of passenger systems. Impacts would increase more than proportionally as additional airports are curfewed. Unlike the passenger case, there would often be no way to restore equivalent service because freighters typically operate deep into the curfew period. The decreased level of service that would accompany extensive curfews might preclude the rapid growth forecast for the air freight industry. There would be little diversion to daytime or early evening flights. Instead, without next-day service, shipments would be canceled or would divert to lower priced modes (primarily motor transportation). These losses would be shared with the air freight industry and with customers who have grown to depend on the service.

With regard to Jackson International Airport, a limited rescheduling of flight times on a voluntary basis may be practical, particularly

with regard to short-haul flights (less than 200 miles). The emphasis here would be to try to reschedule those flights between 10 p.m. and 7 a.m. to operate earlier or later, as the case may be. The measure would apply mostly to those flights that operate before midnight and between 5 a.m. and 7 a.m.

About 10% of the scheduled airline operations into and out of the Airport now occur during nighttime hours (after 10 p.m. and before 7 a.m.). Analysis of current air carrier operations shows that of the 56 jet aircraft operations scheduled to arrive or depart between 10 p.m. and 7 a.m., 30 of these operations (7 short-haul) are scheduled between 10 p.m. and midnight and a further 13 operations (2 short-haul) are scheduled between 5 a.m. and 7 a.m.

As a noise abatement strategy, the limited rescheduling during this period would significantly change existing and forecast Ldn noise contours because the penalty of 10 decibels for nighttime operations would be excluded. However, assuming that a substantial number of operations could be rescheduled to daytime hours, the total noise energy received around the Airport would remain relatively unchanged. The principal benefit would stem from a reduction of operations during periods of low ambient noise and a concomitant reduction in noise complaints. In a way, the measure is similar to a curfew, except that minor rescheduling might not be considered to conflict with interstate or foreign commerce.

On the other hand, the aircraft operations in question have been established to respond to the travel needs of passengers, and they also facilitate the positioning of airline equipment to meet route structure and scheduling requirements. Few of these operations could be rescheduled to daytime hours without degrading service or adversely affecting the ability of the affected airline to make the most cost-effective use of its aircraft. Therefore, a strict curfew could well result in a significant loss of airline service for the Seattle region

and could create considerable pressure on the nationwide air traffic system. (The limited curfew that exists at Washington National Airport is possible because of the availability of airport facilities at nearby Dulles International Airport and Baltimore-Washington International Airport).

Finally, with or without the effects described above, a nighttime curfew may be inconsistent with federal regulations regarding the restraint of commerce and trade, particularly in view of the Airport's role as a destination airport and the lack of any alternative facilities in the area. The same may be true for restrictions imposed against certain types or classes of aircraft. For these reasons, a strict nighttime curfew at the Airport is considered impractical at this time. It is recommended that the feasibility of minor rescheduling be discussed with the affected airlines.

6. Restrict training flights. The only training flights now conducted at the Airport are military aircraft using the ILS. However, the actual number of operations is very small--FAA records show that during the past 12 months only 22 training operations were conducted by C130 and C141 type aircraft. It is recommended that these operations be restricted and every effort be made to have the training flights moved to another facility.

7. Change takeoff, climb-out, or landing procedures or increase approach altitudes. Takeoff, climb-out, and landing procedures can be changed to minimize aircraft noise and at the same time meet aircraft performance, safety, and air traffic control requirements. Generally, for aircraft departures, these procedures involve steeper climb angles, some reduction in power after the aircraft is safely airborne, and delayed gear and flap retraction. For aircraft arrivals, the procedures involve avoiding low, flat approaches that may require higher power settings.

In the Sea-Tac/Communities Plan, implementation of operational procedures such as "two-segment approaches" was advocated. The two-segment approach involves flying an aircraft on final approach at altitudes considerably above the altitudes that would be indicated by a standard 3 degree ILS glide slope beam. Several years ago, a few airlines flew the two-segment approach under visual conditions particularly at airports in California. However, the Airline Pilots Association called the procedure unsafe and the procedure has been discontinued.

The basic takeoff procedure, which is known as the Air Transport Association (ATA) procedure, has specific engine thrust and flap settings to be maintained at certain phases of the climbout. An alternative to the standard ATA procedure is one developed by Northwest Orient Airlines. The Northwest procedure calls for a power cutback at a lower altitude than the ATA procedure and results in a flatter departure profile.

Reference is sometimes made in discussions on noise abatement to an FAR Part 36 procedure. However, FAR Part 36 does not contain an operational cutback procedure. It prescribes only minimum altitudes below which cutback may not be used during noise tests and the minimum airworthiness based thrust that may be used during the test. Nothing in Part 36 or other Federal Aviation Regulation requires air carriers or other operators to use thrust cutback in service nor do Part 36 noise test conditions apply to in-service operations. FAA noise certification test procedures are not a basis for and have not been used to determine the safety of any operational procedure. Further, it has been found that the presently authorized procedure which allows cutback for example, above 700 feet for four-engine aircraft does not necessarily result in more noise pollution than would be obtained if higher power settings were used until 1,000 feet was reached.

The determination of the least "noise polluting" cutback for any specific airport is dependent upon where the community is sited with respect to the end of the runway, the type of aircraft involved, aircraft weight, and other actual operating conditions. Hence, it is extremely difficult to establish general procedures that would apply to all aircraft at Jackson. In addition, even if these procedures could effectively be developed, it is difficult to monitor whether pilots are using these procedures. Thus, although pilots can be encouraged to "fly quiet," enforcement is very difficult.

Nonmilitary aircraft operations at the Airport (with rare exceptions) are conducted in conformance with standard noise abatement procedures that are based on accepted industrywide and FAA policies. These procedures are essentially beyond the control of Airport management. Nothing was found during this study to indicate that further changes would be necessary or helpful.

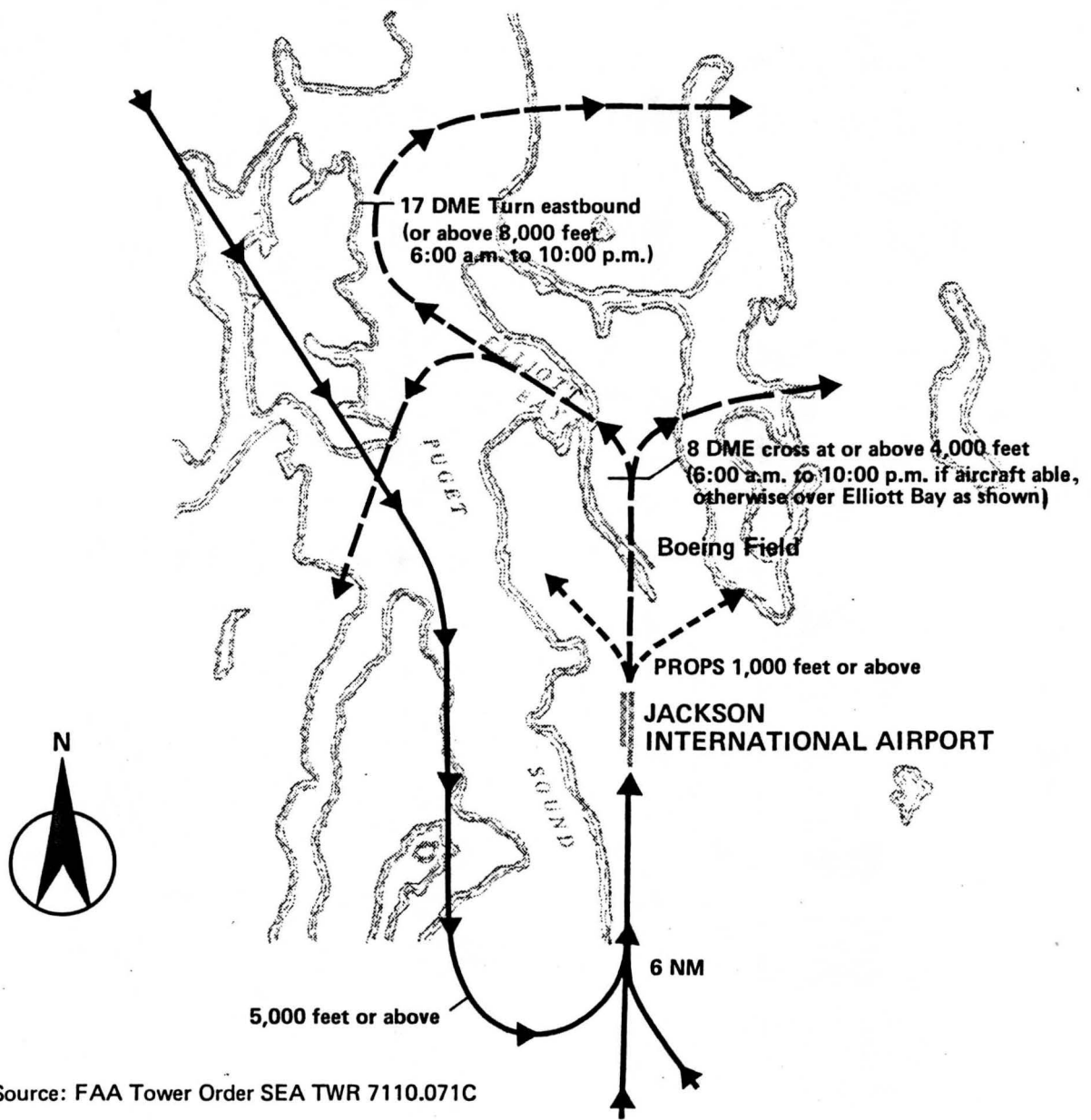
Takeoff and approach altitudes for noise abatement are specified in Tower Order SEA TWR 7110.071C (see Appendix A) and are consistent with the safe operation of aircraft at the Airport. For example, in a south flow of traffic, the Order calls for pilots to fly a straight-out track for 3 miles and reach an altitude of 3,000 feet before making a turn to the west. However, to address citizens' concerns about aircraft drifting from this straight-out track, the FAA plans to implement in the near future a new runway departure procedure that will require all departures in a south flow to climb out on the Seattle VOR 158 radial. The FAA is also considering use of the Seattle VOR to the north for departures. These procedures will assist the pilot in adhering to the procedures set forth in Order 7110.071C. It is recommended that there be no changes made to the altitude specifications contained in this order.

8. Change approach and departure flight patterns or enforce preferential departure tracks. Tower Order SEA TWR 7110.071C contains specific departure headings for aircraft to follow after takeoff. These departure tracks have been designed to segregate and expedite traffic flow. The primary operational considerations in determining the spatial dimensions of such tracks are the location of the "departure fix" or the first "enroute fix" in relation to the departure runway, the air route structure, and the destination airport. Exhibits 5-1 and 5-2 illustrate the arrival and departure procedures set forth in the Order for a north flow and south flow of traffic respectively.

Several suggestions have been made concerning variations to the procedures set forth in the Order. These suggestions are discussed in the following paragraphs.

With regard to air carrier aircraft flight patterns, one suggested change is that aircraft make a right turn toward Puget Sound immediately on departure during south traffic flow. The anticipated benefit of such a change in flight track was that fewer people would be exposed to noise because the aircraft would be flying the shortest route from the Airport to Puget Sound. However, this change has several drawbacks:

- Because of differing aircraft operating characteristics, aircraft would be turning anywhere from one mile to three miles following takeoff. This would mean a broader path of noise exposure than is experienced with the current straight-out Order procedure.
- In a turn, aircraft would not only be lower, but would require more thrust (and hence make more noise) than in a straight-out path.
- Departing aircraft would have to be restricted to a lower altitude to stay clear of arrivals.



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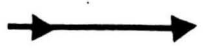

-  Arrivals
-  Departures

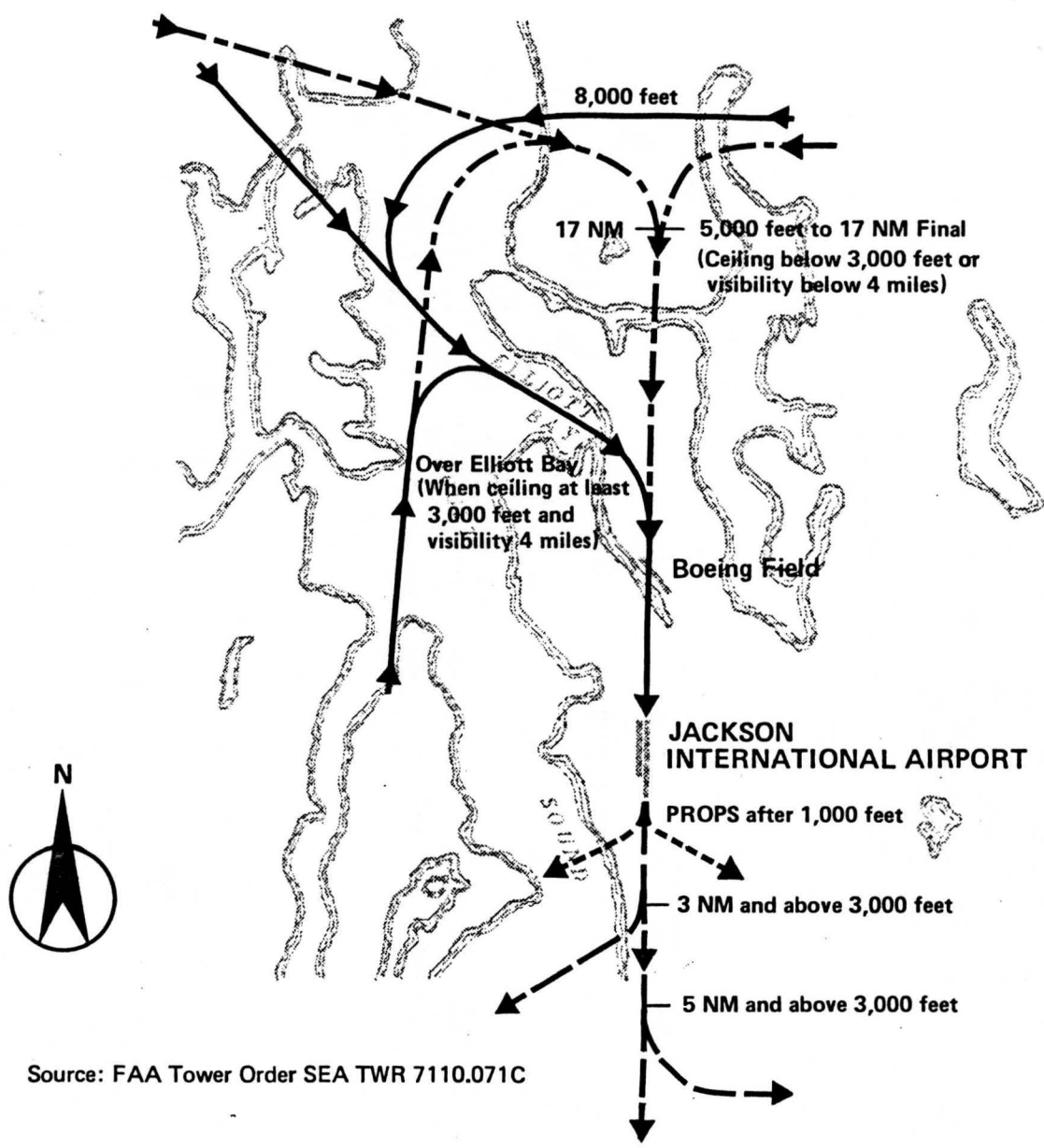
Exhibit 5-1

Noise Remedy Program Update
Jackson International Airport

**NOISE ABATEMENT PROCEDURES
NORTH TRAFFIC FLOW**

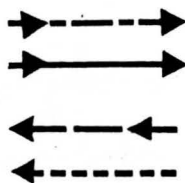


January 1984



Source: FAA Tower Order SEA TWR 7110.071C

LEGEND



Arrivals

Departures

Exhibit 5-2

Noise Remedy Program Update
Jackson International Airport

**NOISE ABATEMENT PROCEDURES
SOUTH TRAFFIC FLOW**



January 1984

- Arrivals would have to be moved farther west.
- Controller workload would increase.

It was concluded that the current procedure with a straight-out track for 3 miles and 3,000 feet is the best noise abatement procedure for departures in a south flow of traffic.

In response to numerous citizen complaints of aircraft noise, the Port requested that the FAA noise abatement procedures in Tower Order 7110.071C be modified. Specifically, the Order prescribes a departure route in a north traffic flow which takes turbojet aircraft over Elliott Bay and Puget Sound in order to avoid areas of dense population. It also prescribes an exception to this route which allows the operation of turbojet aircraft directly over major Seattle residential areas at or above 4,000 feet between 6 a.m. and 10 p.m. The Port requested that the FAA cancel this exception because of noise complaints in the residential areas.

The FAA circulated for public comment the proposed elimination of the exception to the north flow noise abatement procedures. Three thousand one hundred and three (3,103) individuals responded to this study; 82 indicated no opinion or the comments made were not germane to the study; 2,806 voiced objections. Additionally, the King County Council provided the results of a similar Council study conducted by questionnaire. That poll of 2,772 King County residents showed 2,611 people object to the change of existing aircraft routes. Despite these objections, the FAA concluded that the procedure currently in use under the "exception" to Tower Order SEA TWR 7110.71C could be eliminated. However, eliminating this exception would result in:

- An increase in jet noise along already established and utilized routes whenever north flow procedures are in effect.

- Some departure delays in order to avoid congestion along these routes.
- An increase of flights overflying certain communities above 8,000 feet after leaving Puget Sound, e.g., Normandy Park and Ballard.

Appendix B contains the FAA evaluation of this proposed change. As a result of this evaluation, the Port withdrew its request for elimination of the exception to the noise abatement procedures. (See Appendix C.)

Another suggestion concerning modifications to air carrier aircraft flight patterns involved diversion of southbound departures in a south traffic flow to Puget Sound. Normally the southbound departures would go straight out on the runway heading over Federal Way. The suggestion would have these aircraft follow the noise abatement procedure for westbound aircraft--turning to the west after reaching a point 3 miles south of the airport and reaching an altitude of 3,000 feet. Although this suggestion would allow the southbound departures to avoid overflying Federal Way, it would increase the aircraft overflights over the City of Des Moines--a tradeoff in noise exposure. Further, the additional travel time resulting from this suggestion would increase aircraft operating costs, and departing aircraft would have to be restricted to a lower altitude to stay clear of arrivals, resulting in an increase in air traffic controller workload.

With regard to general aviation flight patterns, the Tower Order specifies that for noise abatement purposes, propeller-driven arrivals shall not be given approval to make a base leg within the Airport boundary and that propeller-driven departures shall not be turned after takeoff until reaching 1,000 feet MSL. There is a natural tendency for general aviation pilots to want to get away from the paths of air carrier aircraft as soon as possible (because of speed

differentials, wake turbulence, etc.), thus noise abatement procedures may sometimes not be followed. It is recommended that general aviation pilots be given constant reminders of the noise abatement procedures through signing, newsletters, and tower communications.

In summary, any changes to approach and departure tracks that deviate from a straight-in/straight-out alignment would be in conflict with the Port's acquisition program to the north and south of the Airport. Therefore, it is recommended that any changes to flight tracks implemented by the FAA be consistent with the Port's acquisition program and with Port policy in regard to the Sea-Tac/Communities Plan.

9. Construct noise barrier or berm. Noise barriers or berms would probably be ineffective along the northeast and west boundaries of the Airport site and for homes adjacent to the Airport such as those in Riverton Heights and the Sunset district, for several reasons. First, noise barriers are effective only in line-of-sight situations. Differences in terrain elevations that place the noise-sensitive receptor at a higher elevation than the noise source can negate the effectiveness of a noise barrier because the barrier cannot be constructed high enough to block the line-of-sight transmission of the noise.

As to location, the noise barrier should be placed as close to either the noise receptor or the noise source as possible. Because of height restrictions at an airport (FAR Part 77 surfaces), noise barriers are usually placed closer to the receptor rather than the source. A barrier placed equidistant between the receptor and the source (unless the two are close together) is least effective. Also, general experience with noise barriers, both at airports and along highways, indicates that perceptible noise reductions are achieved only within a few hundred feet of the barrier, about the equivalent of one city block.

Barriers are effective in reducing noise only in the higher frequency ranges. This limits their effectiveness in shielding noise-sensitive

uses adjacent to airports because the ground run-up noise of jet aircraft from engine testing, taxiing, or acceleration on takeoff is dominated by the low frequency components. High frequencies can be deflected or absorbed by noise barriers, the lower frequencies with their higher vibration components cannot.

Finally, local residents can perceive noise barriers in a positive or negative light regardless of the actual noise reduction. If people feel strongly that a noise barrier will improve their noise environment, then, from a perception standpoint, it will. On the other hand, if local residents feel very strongly that nothing can be done to improve the noise environment, the installation of a noise barrier will typically not be perceived as being effective. Also, noise barriers sometimes are perceived in a negative light by residents if they block their view. Still others may feel "closed in" if a high barrier is constructed adjacent to their property. The perception issue must be weighed carefully when the construction of a noise barrier is being considered.

Major airports in the United States where noise barriers have been constructed include Minneapolis, St. Louis, Los Angeles, and the Dulles International Airport serving Washington, D.C. Wold-Chamberlain Field at Minneapolis apparently has had the longest experience with noise barriers. A berm was constructed along the western side of the airport in 1974 and additional berms are currently under construction on both the north and south sides of the airport.

At Minneapolis, the berms were constructed in response to community requests. Although airport personnel feel that actual noise reductions are probably marginal (no conclusive noise tests have been made), residents in the communities adjacent to the berms perceive that the noise environment has improved and noise complaints have dropped. Therefore, airport management feels that since the noise situation

is perceived as being better, they will continue with the berm construction program.

No berm has been constructed without the approval of the affected community. The only complaints received by the airport about the berms to date have been from residents who feel that the berms block their view of the airport. It should be noted that the City of Minneapolis provides the airport with the fill material at no charge so the only real cost is landscaping.

The experience with a noise berm at Lambert-St. Louis International Airport has been just the opposite of the Minneapolis situation. At St. Louis, the residents of a neighborhood adjacent to the Airport wanted their property to be acquired and relocated (the neighborhood fell in the Ldn 75-78 noise exposure range). However, the City Council of the local community desired that every reasonable attempt be made by airport management to preserve the neighborhood--regardless of the desires of residents. Based on the wishes of those who then served on the City Council, the St. Louis Airport Authority decided to construct the berm. Unfortunately, the reaction of affected residents to the berm was even more hostile than before. As a result, the local City Council conceded that the neighborhood should be acquired and that a noise barrier was of little value in this instance.

The actual effectiveness of the berm in reducing noise at St. Louis was also tested. These tests indicated a 5-6 decibel reduction at the foot of the berm on the neighborhood side, decreasing to a zero reduction about 150 feet into the neighborhood. In effect, only the first row of homes realized any appreciable noise reduction.

As occurred at Minneapolis, a number of residents in the St. Louis neighborhood objected to the berm in general because it blocked their view of the airport. Also, because the berm varied between 25 and 30 feet in height, some residents complained that the massiveness of

the berm made them feel closed in. The St. Louis Airport Authority is now acquiring the neighborhood and eventually will remove the berm so the newly acquired property can be added to the Airport proper.

The Los Angeles experience falls between that of St. Louis and of Minneapolis. At Los Angeles, a noise wall was constructed on top of a berm for a length of approximately one city block. The average height of the berm/wall was about 30 feet with the upper 20 feet being the wall. After the berm/wall was constructed, the Los Angeles Department of Airports conducted noise tests which indicated that the noise reduction was 8-9 decibels immediately adjacent to the berm, dropping to zero reduction approximately 150-200 feet away from the berm.

Community reaction to the berm was not measured at Los Angeles. According to airport personnel, general reactions to the berm indicated that some residents felt that the berm/wall did mitigate noise while others indicated that the money spent constructing the berm could have been better spent in acoustically treating their homes.

Extensive vegetation belts have been used as noise barriers at Dulles International Airport. At Dulles, the original design specified a 2,000-foot forest belt around the airfield except in the clear zone, approach areas, and terminal area. It is not known if the noise reduction achieved was due to the vegetation or because no noise-sensitive use was permitted within 2,000 feet of the airfield. The report "Noise Attenuation of Foliage and Ground Cover Around Airports," prepared by Bolt Beranek and Newman, Inc., in 1972, did conclude, however, that the effectiveness of foliage and ground cover as a means of attenuating the noise generated during ground roll and ground run-up operations is limited.

From the review of airports where noise barriers have been constructed, several general conclusions can be made. First, noise barriers are not particularly effective in shielding entire neighborhoods because

of the limited distance away from the barrier that noise reductions are actually achieved. Barriers might be effective for shielding a single facility if that facility is adjacent to the barrier. Second, the perceived improvement in the noise environment as a result of constructing a barrier depends more on the outlook of affected residents than it does on any measurable noise reduction. And, third, construction of barriers close to the source of noise on an airport is very difficult, if not impossible, because of the necessarily rigid height restrictions imposed by FAR Part 77.

A case in point is the use of noise barriers to shield the Riverton Heights neighborhood. The end elevation of Runway 16L is 429 feet above mean sea level (MSL) while the elevation of the nearest homes in Riverton Heights is about 400 feet MSL. Ideally, to protect the Riverton Heights neighborhood, a noise barrier should be constructed close to the end of Runway 16L. This is not possible because of FAR Part 77 height restrictions and because the terrain drops steeply to the north away from the end of the runway.

The next best solution would be to build a noise barrier adjacent to the neighborhood. Such a barrier would be parallel to State Highway 518 on a diagonal between 24th Avenue South and South 154th Street. A review of the topography indicates that it would be very difficult to construct a noise barrier in this location. The neighborhood is situated on a plateau whose southwestern edge drops off steeply to State Highway 518. There is not sufficient distance between the edge of the plateau and the homes to construct an earthen berm, although it might be possible to erect a masonry noise wall. Such a wall would be very close (within 20 feet in some instances) to the homes located along the southern edge of the plateau. To shield the homes from Airport-generated noise, the noise wall would have to be at least 20 feet high. It is very doubtful that the local residents would be in favor of a wall that high so close to their homes.

Even if a noise wall were to be built, it would be effective only for the first row of homes. Thus, only a few homes would realize any form of noise reductions if a wall were built 20 feet high and approximately 1,500 feet long, at a cost ranging from \$300,000 to \$500,000.

A similar set of problems relate to constructing a noise barrier or berm to mitigate aircraft noise in residences adjacent to the western boundary of the Airport. The primary source of noise that might be mitigated by a noise barrier on the west side of the Airport is from aircraft taxiing on the east side of the airfield or from aircraft on the runways. In either case, it is not possible to construct a barrier or berm close enough to the source of the noise (within 150 feet) that would be effective. The construction of a barrier or berm close to the residences themselves would be largely ineffective due to the difference in elevation of the airfield (approximately 400 feet MSL) and the majority of the affected residences (generally below 350 feet MSL). Therefore, the construction of noise barriers or berms is not recommended.

10. Expand noise monitoring system. In 1976, a permanent noise monitoring system was recommended in the Sea-Tac/Communities Plan. The original system was designed and installed at the Airport in July 1979 and began operations in September of that year. In 1982, the Sea-Tac International Airport Noise Exposure Update reevaluated the noise analysis in the 1976 Sea-Tac/Communities Plan. This recent study states that noise exposure levels differ from those shown in the Sea-Tac/Communities Plan; noise exposure levels have decreased in some areas but increased in others.

The Noise Exposure Update indicates that there are significant "noise bulges" on both the east and west sides of the Airport. These areas contain noise levels that are as high or higher than some of the areas currently being monitored directly north and south of the runways.

Predictably, these "bulges" are located at the northern and southern sidelines of the runway. They are caused by the approach and takeoff operations that cause such high noise levels directly north and south of the runways. However, no monitoring stations are within the existing noise monitoring system to validate this information, to monitor continuing noise exposure trends, or to gather objective information on which to base future noise remedy planning activities for these specific areas. Further, community members have requested that additional noise measurements be taken in the areas adjacent to the Airport.

Because of this gap in the noise data, it is recommended that additional monitoring be conducted on the west and east sides of the Airport in areas with significant noise exposure levels. By installing monitors on both the east and west sidelines at the following proposed locations, it will be possible to monitor high noise levels generated from approaches and departures, including the reverse thrust of arrivals and the engine run-ups associated with departures. The following two locations are considered suitable for additional monitoring stations:

EAST SIDE OF AIRPORT: A "noise bulge" with predicted levels of more than 70 Ldn occurs in the Riverton Heights area immediately northeast of the Airport. This area has shown an increase in the noise levels over the noise exposure levels predicted in the original Sea-Tac/Communities Plan.

WEST SIDE OF AIRPORT: A "noise bulge" with predicted levels of more than 70 Ldn occurs in the area immediately southwest of the Airport around 192nd Street. This area has also experienced an increase in noise over the levels predicted in the Sea-Tac/Communities Plan.

Two options are available for providing additional noise monitoring-- permanent monitors or portable monitors. The following listing compares these two options:

<u>PERMANENT MONITORS</u>	<u>PORTABLE MONITORS</u>
Will provide 24-hour year-round monitoring at 2 sites.	Will provide monitoring 16 days a year at 3 sites.
Will provide absolute data exactly equivalent with that already collected by NMS.	Data must be collected and analyzed and is not as easily calibrated as that from the permanent sites.
Cannot be used to monitor other sites.	Can be moved to a variety of sites.
First year cost will be \$72,000 plus \$600 for yearly maintenance.	First year cost will be about \$15,700.
After initial cost, only significant expense will be \$600 for maintenance. Staff time will not increase measurably over what is now required, scheduled, and budgeted.	Yearly cost for staff time will continue to be about \$10,000.
Distinguishes airplane versus nonairplane noise.	Does not distinguish airplane versus nonairplane noise as well as permanent monitors.
Will add to Port's credibility by showing Port's willingness to gather data as thoroughly as possible.	Community may claim that portable monitoring is missing much of the really "loud" noises.
Once the new monitors are in place, the administrative and operational factors are inexpensive and routine.	Year-round staff or consultant time must be budgeted and assigned.

In summary, as long as aircraft operate from Jackson International there will be a need to monitor noise around the Airport in order to continue validation of the model predictions and provide continuous

assessment of the impacts of aircraft operations on the communities surrounding the Airport. However, a need exists for noise monitoring east and west of the Airport, and it is recommended that this need be met by expanding the existing noise monitoring system by at least two additional monitors on the Airport sidelines.

11. Maintain noise abatement staff. The Port of Seattle has staff who are responsible for the noise abatement aspects of the Airport's operation. These include environmentalists who look after the noise monitoring system, planning staff involved in the Noise Remedy Program, and a noise abatement officer responsible for dealing with noise complaints. It is recommended that such staffing be maintained and augmented as appropriate to carry out Port-approved programs of improvement.
12. Establish noise abatement committees. In view of the sometimes differing perspectives concerning aircraft noise abatement procedures, it is recommended that a Task Force be established to monitor noise abatement/remedy measures.
13. Use facilities siting as buffer. As facilities at the Airport are expanded, it is recommended that, to the extent possible, buildings be used as a buffer between taxiing aircraft and adjacent noise-sensitive uses. This recommendation should be reflected in any policy guidance incorporated in the Airport master planning activities currently under way.
14. Restrict ground movement of aircraft. The use of power to move an aircraft from one gate to another or to maintenance areas should be restricted to daytime hours. Although as few as 4 or 5 movements under power occur during the nighttime hours, this restriction will be inconvenient to those airlines that perform maintenance on their aircraft at the Airport. However, the benefits to the adjacent

communities in terms of alleviating single-event annoyance would be substantial. It is recommended that aircraft should be towed from one gate to another or to maintenance areas during the run-up curfew, i.e., 10 p.m. to 7 a.m.

15. Comply with FAR Part 36 standards. Setting specific noise limits that would effectively ban an aircraft type has been tried at other airports and has met limited success in the courts.

The Port Authority of New York and New Jersey noise rules set the same aircraft noise level limits as federal noise rules (FAR Part 36), but speed up compliance schedules for meeting these limits. Although the federal rules require that only 50% of each airline's four-engine jet aircraft comply with Federal Aviation Regulations Part 36 Stage 2 noise limits by 1983, the regulations issued by the Port Authority require 75% of four-engine jet aircraft landing or taking off at these three airports to be in compliance with FAR 36 Stage 2 noise limits by that date. Congress exempted foreign carriers from having to shift to quieter aircraft until 1985, and the result has been that noisier airplanes are being sold to these carriers, increasing noise levels at Newark International and John F. Kennedy International Airports. The regulation has been in force for most carriers since January 1, 1983. However, the agency is enjoined from enforcing the rule pending the appeals court decision.

An exception that has been working is at Boston's Logan International Airport where there is a night restriction whereby airlines that operate aircraft that do not comply with FAR Part 36 noise standards may be taken to court by Massport and fined. Further, with regard to airlines entering the Boston market since deregulation, Massport has in most cases been able to persuade the carriers to retrofit, re-engine, or replace their aircraft serving Logan before federal

law requires. As a result of Massport's efforts, compliance with FAR Part 36 noise standards at Logan is far ahead of the national average.

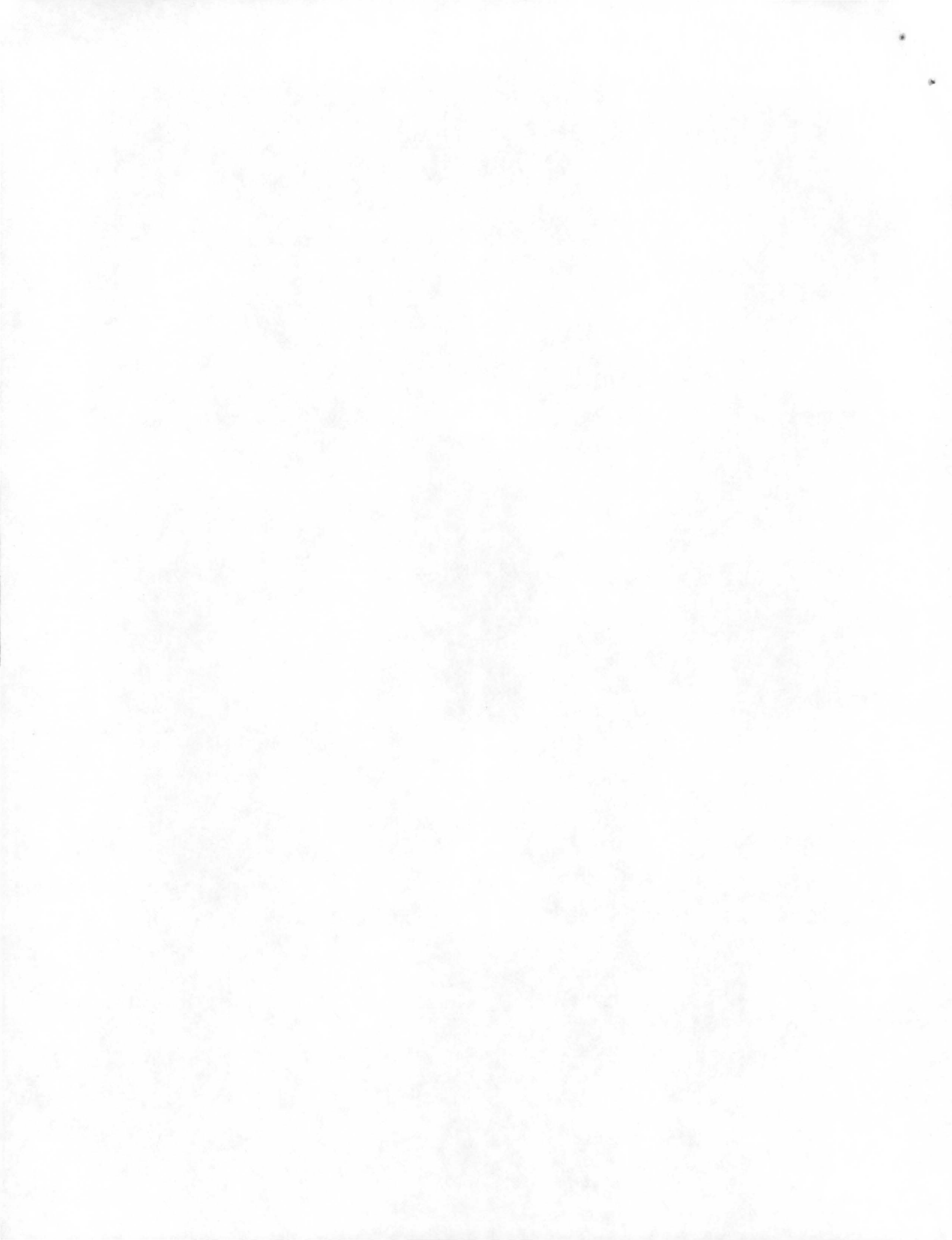
Although compliance with FAR Part 36 noise standards is typically required by January 1, 1985, there are a few exceptions, i.e., two-engine aircraft with 100 seats or less, serving small cities, are exempt until January 1, 1988. Thus, it is recommended that the Port support efforts to ensure compliance with the FAR Part 36 noise standards in accordance with the current schedule.

16. Impose noise-related landing fee. The implementation of a comprehensive airport environs plan can be costly. For example, the implementation of the Sea-Tac/Communities Plan has resulted in expenditures or commitments to date of about \$50 million. Los Angeles International Airport has spent more than \$200 million to date for litigation and for land acquisition and relocation programs to mitigate noise. Lambert-St. Louis International Airport has approved expenditures of about \$60 million for land acquisition and for purchase assurance and insulation programs over the next 10 to 15 years. With the continued growing concern over aircraft noise, it is likely that more and more airports will be faced with spending large sums of money to deal with environmental problems associated with aircraft operations.

The addition of what could be a multimillion dollar item to an airport's annual budget would obviously affect the fragile balance between revenues and expenditures and would be viewed with considerable interest by the airlines (who are usually responsible for a significant proportion of an airport's revenues) and other aircraft operators. Because of differences in the frequency of operations, types of aircraft, and other factors, some aircraft operators contribute more than others to the overall aircraft noise exposure in the airport environs.

Traditionally, the airport sponsor has included such costs in the calculation of landing fees paid by aircraft operators. However, as environmental costs increase, the question of equitable payment by the aircraft operators becomes more of a concern--since some aircraft are quieter than others. On the other hand, because several of the airlines have long-term use agreements that set forth how landing fees are to be computed, that there may be a question of legality with respect to discrimination if noise-related landing fees are assessed for other carriers. Therefore, it is recommended that noise-related landing fees not be pursued at this time.

APPENDICES



APPENDIX A

ORDER

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Seattle-Tacoma Tower
Seattle, Washington

SEA TWR 7110.071C

10/7/80

SUBJ: NOISE ABATEMENT PROCEDURES

1. PURPOSE. This order prescribes action to be taken in the application of noise abatement procedures with aircraft to and from Seattle-Tacoma and Boeing Field Airports.

2. DISTRIBUTION. Seattle-Tacoma Tower, Seattle ARTCC, Boeing Tower, and ANW-530.

3. CANCELLATION. Seattle-Tacoma Tower order SEA TWR 7110.071B dated July 25, 1973.

4. POLICIES.

a. All propeller driven aircraft are excluded from the provisions of this order except as specified.

b. Turbojet aircraft operating locally within the Seattle Approach Control Terminal Area shall be assigned 5,000 feet and above. These aircraft shall be routed over Puget Sound as much as possible.

c. The provisions of this order apply to both VFR and IFR turbojet aircraft.

d. The procedures apply unless safety or urgent traffic requirements dictate otherwise.

5. PROCEDURES.

a. Departures - North Flow. Assign departures runway heading or SID.

(1) Route departures, avoiding areas of dense population, westbound over the middle of Elliott Bay. After leaving Elliott Bay, the aircraft should be at least 1-1/2 NM from the east shoreline while north or southbound over Puget Sound.

(a) Between the hours of 0600 and 2200 local time, aircraft shall not be turned eastbound to recross the shoreline until reaching 8,000' or the 17 NM fix whichever comes first.

(b) Between the hours of 2200 to 0600 local time, aircraft shall not be turned eastbound to recross the shoreline until reaching the 17 NM fix.

Distribution: SEA TWR, SEA ZSE, BFI, and ANW-530

Initiated By: HN

(c) Aircraft may be turned southeast bound to recross the shoreline west of Seattle-Tacoma International Airport after leaving 8,000'.

(2) Exception. Between the hours of 0600 to 2200 local time, Seattle-Tacoma eastbound departures shall be issued a restriction/SID to cross the 8 NM fix at or above 4,000' and, at that point, turn right to conform with established flow. If the pilot does not accept the restriction, the flight shall be handled in accordance with Paragraph 5.a.(1), above.

(3) If in the judgment of the controller--weather, traffic and work load permitting--aircraft which will be routed over Elliott Bay may be instructed to "Turn left heading _____, adjust your turn to fly out the middle of Elliott Bay."

b. Departures - South Flow. Assign departures runway heading or SID.

(1) Seattle-Tacoma.

(a) Westbound departures shall not be turned until the aircraft have reached a point at least 3 miles south of the airport and have vacated 3,000 feet.

→ from radar antenna

(b) Eastbound departures shall not be turned until the aircraft have reached a point at least 5 miles south of the airport and have vacated 3,000 feet.

(2) Boeing Field. Aircraft shall not be turned until reaching 3,000 feet.

c. Arrivals - General.

(1) Aircraft being vectored to Boeing Field and/or Seattle-Tacoma shall not be cleared below 5,000 feet until necessary for normal straight-in descent or turn to base leg.

(2) Aircraft should be vectored at least 1-1/2 miles from the east shoreline when north or southbound over Puget Sound.

d. Arrivals - South Flow.

(1) Seattle-Tacoma.

(a) Arrivals from the south shall be vectored over Elliott Bay to the final approach course. If unable to comply with the Elliott Bay routing, add a thousand feet of altitude to the aircraft's base leg for each 3 miles the aircraft is north of Elliott Bay.

(b) Arrivals From the East/North.

1 When the ceiling and visibility at Boeing Field or Seattle-Tacoma is below 3,000 feet and/or 4 miles, arrivals shall be vectored to intercept the final approach course 17 NM north of the airport at 5,000 feet.

2 When the ceiling and visibility at Boeing Field and Seattle-Tacoma is at least 3,000 and 4 miles, aircraft shall be vectored over Puget Sound and through Elliott Bay.

Aircraft from the east shall be routed through the final approach course at or above 8,000 feet.

(c) VFR aircraft shall be instructed to make base leg over Elliott Bay.

(d) Aircraft conducting visual approaches to Runway 16L/R are expected to conform to instructions contained in the Visual Bay Approach. Aircraft which do not have this approach available shall be vectored to base leg at Elliott Bay before approach clearance is issued.

(2) Boeing Field.

(a) VFR aircraft and aircraft on visual approaches should be routed through Elliott Bay whenever possible.

e. Arrivals - North Flow.

(1) Seattle-Tacoma arrivals shall be vectored/instructed to intercept the final approach course south of DONDO LOM.

(2) VFR/visual approach aircraft shall be instructed maintain 3,000 feet or above until on the final approach course.

f. Seattle-Tacoma Landings and Takeoffs.

(1) Preferred takeoff runway south is 16L.

(2) Preferred landing runway north is 34R.

(3) Propeller driven departures shall not be turned after takeoff until reaching 1000' MSL.

(4) Propeller driven arrivals shall not be given approval to make a base leg within the airport boundary.

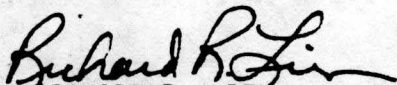
10/7/80

SEA TWR 7110.071C

6. COMPLIANCE.

a. Full compliance is expected whenever possible, even though it may be necessary to delay traffic.

b. Notify your supervisor of any pilot non-compliance or lack of cooperation regarding these procedures.



RICHARD R. LIEN
Chief, Seattle-Tacoma Tower

APPENDIX B

EXECUTIVE CORRESPONDENCE



U.S. Department
of Transportation

Federal Aviation
Administration

Northwest Mountain Region
Colorado, Idaho, Montana,
Oregon, Utah, Washington,
Wyoming

17900 Pacific Highway South
C-68966
Seattle, Washington 98168

November 14, 1983

Mr. Vernon Ljungren
Director of Aviation
Port of Seattle, P.O. Box 68727
Jackson International Airport
Seattle, Washington 98168

Dear Mr. Ljungren:

On August 15, 1983, the FAA (Federal Aviation Administration) circularized for public comment Aeronautical Study 83-ANM-181-NR (copy attached) in response to a request from the Port of Seattle to eliminate the current "exception" to north flow noise abatement procedures. This study outlines the procedures that would be required in order to handle east and southeastbound jet aircraft departing runways 34 during daytime hours (0600-2200) along already established routes. The period for submitting comments closed on October 15, 1983. Study of these comments, as well as review of operational considerations, has been completed.

Three thousand, one hundred three (3,103) individuals responded to this study; 82 indicated no opinion or the comments made were not germane to the study; 2,806 voiced objections. Additionally, the King County Council provided the results of a similar Council study conducted by questionnaire. That poll of 2,772 King County residents showed 2,611 persons object to the change of existing aircraft routes.

A number of alternate plans and ideas for noise relief were submitted along with comments. These will have to be reviewed and considered separately.

Alaska Airlines, United Airlines and the Air Transport Association of America (ATA) voiced objections based on the excess energy (fuel) consumption, additional economic costs to the users, and the capacity restraints of the airport and the terminal airspace(s).

The most referred to objections of nonaeronautical nature -- listed in order of the number of times mentioned -- were:

- o Concern for possible adverse effects on property values and other negative economic impacts if aircraft traffic would be routed over or increased over the neighborhoods of respondents.
- o Objections to changing those traditional traffic routes which have been in use for 10 years.

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- o Belief that residents of Bellevue, Madrona, Leschi, Mercer Island, etc., share the use of the Henry M. Jackson International Airport and should also share the effects (noise) of that facility.
- o Concern for possible adverse effect on the life styles and health of residents and the ecology of the neighborhoods if aircraft traffic would be routed over or increased over those areas.
- o Concern for added cost to airline companies and increased fuel consumption. Remarks cited that additional costs would be borne by passengers; that increased cost could hurt/bankrupt those companies already having financial problems and/or that increasing fuel consumption is detrimental to national efforts to save energy.
- o Concerns by those who had selected their present residences to specifically avoid being under/near existing aircraft routes would now be placed under/near the "new" routes.
- o Feelings that proposed "alternate" routings, being more circuitous, would increase the time of eastbound aircraft over heavily populated areas, and therefore expose area residents to more (longer) noise per aircraft.
- o Concerns for safety ranged from fear of aircraft overflying, to feelings that congestion along remaining routes would increase the potential for collision.
- o Feelings that the proposal would not reduce noise but would only shift the same noise to a different community.
- o Feelings that the proposal is not based on logical or technical reasoning; that the route change is arbitrary/capricious or that the proposal was formulated to satisfy political/influential interests only.
- o Concerns that this proposal violates established land-use plans and promises by concerned agencies.
- o Concerns of potential for adverse effects on the hospitals, schools, retirement homes, etc., that would experience new or increased traffic over/near them.
- o Feelings that such action should not be taken without hearings, tests and/or before full environmental impact statements (EIS) are prepared.

This study revealed:

- That the elimination of this one route would not derogate air safety. The alternate routes are now used during the 2200-0600 time frame, and have been proven viable.

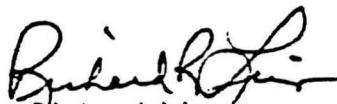
- That both affected air traffic control facilities could resectorize and/or change procedures to effectively handle the flow as proposed.
- That the proposed circuitous routing of eastbound turbojet aircraft would increase flight time and fuel consumption of these aircraft. ATA estimates this would increase operating costs by approximately \$1.5 million annually.
- That restricting jet aircraft to a single initial departure path (Jackson International-Boeing Field-Elliott Bay) will result in ongoing delays to preclude route congestion, etc. Amount of delay and associated costs will vary with existing demand (number of aircraft awaiting departure) and cannot be accurately estimated.
- That the proposal would eliminate departing jet aircraft along, and resultant noise beneath, the right turn departure route. Those communities (Madrona/Leschi Park/Mercer Island/Bellevue, etc.) would be relieved of the effects of jet aircraft noise(s) during north departure operations. However, as the same number of aircraft would depart and use other established routes the noise and effects would probably be redistributed as follows:
 1. Between Jackson International and Boeing Field: No change.
 2. Between Boeing Field and Puget Sound: All north departing jets would use this route, an estimated 54% increase in number of flights. Normal altitudes along this segment are between 3,000' and 7,000'. Although the last 5 miles of this segment is "over" Elliott Bay, jets turning north/south do increase noise impact along the opposite shore areas. The Magnolia/Queene Anne Hill/West Point Communities could experience a 43% increase (jets turning south) in noise events while the West Seattle/Alki areas could experience a 75% increase (jets turning north) in noise events.
 3. Areas north of Magnolia and south of White Center: East/southeast jet aircraft would be rerouted via the "over Puget Sound" routes if the "Right-Turn" route is eliminated as proposed. These aircraft would be turned eastbound over populated areas upon reaching 3,000'. This would result in a marked increase of aircraft overflights (above 8,000') in these areas.
 4. Vashon Island: South/eastbound jet aircraft would "join" the southbound flow until abeam the Henry M. Jackson Airport and at/above 3,000'. This could increase overflights of North Vashon Island by about 43%. These flights will normally be above 7,000'.

It is the conclusion of the FAA, therefore, that the procedure currently in use under the "exception" to Order SEA TWR 7110.71C can be eliminated. This, however, will result in:

1. An increase in jet noise along already established and utilized routes whenever north flow procedures are in effect.
2. Some departure delays in order to avoid congestion along these routes.
3. An increase of flights overflying certain communities above 8000' after leaving Puget Sound, e.g., Normandy Park and Ballard.

Based on these conclusions, we request that the Port of Seattle inform the FAA if it wishes to eliminate the "exception" to current noise abatement procedures. Pending this notification we will continue to operate under current procedures. So that we may reach a decision in a timely manner and inform those individuals who participated in the study of this decision, we request that you reply no later than November 23, 1983.

Sincerely,



Richard Lien
Air Traffic Manager
Seattle Airport Traffic Control Tower
Seattle, Washington

Enclosure



U.S. Department
of Transportation
**Federal Aviation
Administration**

Northwest Mountain Region
Colorado, Idaho, Montana,
Oregon, Utah, Washington,
Wyoming

17900 Pacific Highway South
C-68966
Seattle, Washington 98168

In Reply Refer To:

83-ANM-181-NR

TO ALL CONCERNED:

The Federal Aviation Administration (FAA) is conducting an aeronautical study of a proposal by the Port of Seattle (POS), owner and operator of Seattle-Tacoma International Airport, to modify current noise abatement procedures at that airport.

This proposal would modify the departure path of eastbound and southeastbound turbojet aircraft when departing to the north -- Runways 34. Current procedures are as follows:

1. Aircraft are instructed to continue outbound on "Runway Heading (338° magnetic) " until advised to turn by Air Traffic Control (ATC). In the vicinity of Boeing Field/King County International Airport, when traffic conditions permit, the Air Traffic Controller instructs these flights to turn westbound over Elliott Bay and then north or southbound over Puget Sound at least 1 1/2 nautical miles (NM) from the Puget Sound east shoreline. Eastbound aircraft are not turned to recross the shoreline until:
 - (A) Between the hours of 6:00 a.m. and 10:00 p.m.; reaching 8000' AMSL (Above Mean Sea Level) or crossing a point 17NM north, or
 - (B) between the hours of 10:00 p.m. and 6:00 a.m.; crossing a point 17NM north, or
 - (C) in the case of southeastbound aircraft; reaching 8000' AMSL and a position west of Seattle-Tacoma International Airport.
2. Between the hours of 6:00 a.m. and 10:00 p.m., those eastbound aircraft that can climb so as to cross a point 8NM DME (Distance Measuring Equipment) from the Seattle VORTAC at or above 4000' AMSL are instructed to continue outbound on "Runway Heading" until crossing the 8NM DME fix (at or above 4000' AMSL) and then turn to a magnetic heading of 070°. The Seattle VORTAC is a Radio Navigational Aid located on the south end of Seattle-Tacoma Airport. The 8NM point is in the vicinity of Jefferson Park Golf Course, which is approximately 6.3NM north of the runway end.

83-ANM-181-NR

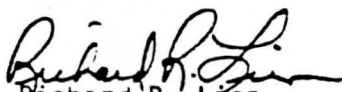
The Port of Seattle proposes to eliminate the right turn at the 8NM fix (6:00 a.m to 10:00 p.m.) routing. During those periods when aircraft are taking off to the north, this proposal would require all jet departures follow the Elliott Bay routing. Probable traffic load and noise impact distribution is depicted on the attached diagram.

Interested persons are invited to participate in this study by submitting in writing such data, views or arguments as they may desire. Comments relating to the environmental, energy or economical impacts that might result from adoption of this proposal, as well as comments relevant to the effect the proposal would have on aviation, are invited. Communications should be addressed to:

Federal Aviation Administration
Seattle-Tacoma ATCT
Rm. 417, Admin. Bldg.
Seattle-Tacoma Int'l Airport
Seattle, Washington 98158

All communications should identify the Study Number -- 83-ANM-181-NR. All comments received on or before the closing date for comments September 15, 1983, will be considered by the Federal Aviation Administration before taking any action on this proposal.

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Richard R. Lien
Air Traffic Manager
Seattle-Tacoma Air Traffic Control Tower

Issued in Seattle, Washington on August 15, 1983

APPENDIX C



PORT OF SEATTLE

SEA-TAC INTERNATIONAL AIRPORT
P.O. BOX 68727 / SEATTLE, WASHINGTON 98188

December 13, 1983

Mr. Richard Lien
Air Traffic Manager
Federal Aviation Administration
Air Traffic Control Tower
Room 417, Administration Building
Jackson International Airport
Seattle, Washington 98158

Dear Dick:

Re: Aeronautical Study 83-ANM-181-NR

This responds to your letter of November 14, 1983 which requests the Port of Seattle to inform the Federal Aviation Administration if it wishes to recommend eliminating the "exception" to current noise abatement departure procedures in a north traffic flow at the Airport.

The Federal Aviation Administration's thorough evaluation of this proposed modification to current departure procedures is appreciated. The evaluation addresses the environmental, energy, economic and operational impacts that would result from implementation of this proposal, as well as the scope of community comments which were submitted in large numbers and which largely voiced objections to the proposal.

Based on all the factors addressed in your evaluation, we respectfully recommend that the Federal Aviation Administration not eliminate the "exception" to current noise abatement departure procedures in a north traffic flow.

At the same time, the Port of Seattle has been asked by community leaders to assist them in proposing to the FAA that a program be established to formally monitor adherence to existing noise abatement procedures. During the two-month comment period provided for Aeronautical Study 83-ANM-181-NR, many noise and safety concerns were expressed by citizens who believe the current noise abatement procedures are routinely violated by both arriving and departing aircraft. They believe that many of the problems associated with aircraft noise over King County neighborhoods could be greatly alleviated if current noise abatement procedures were strictly enforced.

Mr. Richard Lien
December 13, 1983
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In response to these concerns, we propose a monitoring and compliance program to include the following tasks:

- (1) Review noise abatement procedures with aircraft operators, both airlines (via Air Transport Association) and pilots (via Air Line Pilots Association and airline supervisory pilot personnel), and advise them of the non-compliance issue and seek improvements.
- (2) Monitor general compliance by route and altitude.
- (3) Establish an admonition process for continuing non-compliance.
- (4) Establish a task force committee made up of FAA, Port, other public agency, aviation industry, and community representatives to oversee this monitoring process.

Cooperation between the Federal Aviation Administration and the Port of Seattle, along with the airline industry, in these noise abatement efforts will help achieve a more compatible relationship between the Airport, its aviation users, and those affected by aircraft noise. The Port Commission believes this is a matter of highest priority. We must work together to seek an improvement.

Please contact me should you have any questions.

Sincerely,

Vernon L. Ljungren
Director of Aviation

JY/2582p

cc: Port Commission
R. D. Ford, Executive Director
J. D. Dwyer, Senior Director of Operations