STATE OF WASHINGTON
PUGET SOUND REGIONAL COUNCIL

In the Matter of:

Expert Arbitration Panel's Review of Noise and Demand/System Management Issues at Sea-Tac International Airport

ORDER ON PHASE I NOISE ISSUES

January 9, 1995

The Expert Arbitration Panel on Noise and Demand/System Management Issues (the "Panel") has carefully considered the arguments and evidence with respect to what we have termed Phase I of the Noise Issues. Written and oral submissions on these issues have been presented to us by the Port of Seattle ("POS"), the Puget Sound Regional Council ("PSRC"), the Washington State Department of Transportation ("WSDOT"), the Federal Aviation Administration ("FAA"), the Coordinating Committee and by a variety of groups and individuals representing residents of communities affected by Airport noise, including the Regional Commission on Airport Affairs ("RCAA"), the Airport Communities Coalition ("ACC"), the Airport Noise Group ("ANG") and many individuals who appeared before the Panel to offer their comments to us. On December 2, 1994, we announced our decision on the scope of the Panel's inquiry on Noise Issues and indicated that a written order was soon to follow. Thereafter, we received some additional written submissions by the POS, the RCAA, the Federal Way Chapter of the RCAA, the ACC, the ANG and Air Washington. This is the written order containing our decision on the scope of the Panel's inquiry on Noise Issues.

We have concluded that our role under PSRC Resolution A-93-03 is to determine whether the POS has scheduled, pursued and achieved a reduction in measurable, real on-the-ground noise impacts. To meet its burden under the Resolution, as we interpret it, the POS must offer us reliable evidence, based upon actual measurements of on-the-ground noise, that by 1996 there has been an objectively measurable, meaningful reduction in aircraft noise impacts in the affected communities surrounding the Airport.

Under the Resolution, it is not enough for the POS to show that it has met the goals of the Noise Budget and the Nighttime Limitations Program (or the goals of additional programs specified by the Mediated Noise Agreement). Rather, the POS must establish that through whatever means, it has reduced the impact of on-the-ground noise in a way that residents of the affected communities could appreciate. In our view, therefore, proof of compliance with the Mediated Noise Agreement is useful, but not necessarily sufficient, to establish that the noise reduction requirement of the Resolution has been met.

We are convinced that the Resolution was intended to condition the approval of the third runway upon a showing that the noise impacts of the existing Airport have been reduced in a significant way. This means, to us, that it is not enough only to show that there has been a measurable reduction in average sound levels as determined by the Day-Night Level (DNL) metric using the existing Airport Noise Monitoring System. A measurable reduction of that sort might be so small, or have such a character, that even by objective standards, it could not be expected to make a material difference to the communities that surround the Airport. The 11 remote monitoring sites (RMS) of the existing Noise Monitoring System may also not be sufficiently representative of the locations of significant on-the-ground noise impacts generated by aircraft using the Airport.

The question we must decide is whether there has been a reduction in real noise impacts that by objective measures is significant and meaningful. We are not persuaded that the deletion of the words "reasonable, meaningful" from the description in the PSRC's Implementation Steps of the reduction in on-the-ground noise to be validated is of any consequence. We do not believe that either an "unreasonable" (i.e., unreachable or infeasible) or a "meaningless" (i.e., inappreciable or trivial) reduction in noise was contemplated by the Resolution.

The POS has not demonstrated that the Noise Validation Methodology (NVM) presented in *Noise Validation Methodology in Compliance with PSRC Resolution A-93-03* ("the NVM Report"), as it exists today, would be a valid method of determining whether the required reduction in on-the-ground noise has occurred even if it were a valid method of measuring success in meeting the ANEL goals of the Noise Budget. The Panel does, however, note several important points about the proposed NVM:

- The proposed NVM is based, as it should be, on measured, not predicted, on-the-ground sound levels.

- The proposed NVM, as it should, measures on-the-ground noise from *all* Airport noise sources, not just landing and departing domestic commercial aircraft that are subject to the noise budget.[1]

- The proposed NVM, however, depends entirely upon sound levels that have been and will be measured only at the 11 existing RMS around the Airport.

- The POS has not demonstrated that the 11 RMS will adequately reflect the levels experienced by a representative sample of the impacted population.[2]

---

[1] These sources include nighttime as well as daytime flights, cargo flights, international flights, military flights and general aviation flights, plus all noises made by aircraft or auxiliary equipment while on the ground (including taxiing and ground run-up during maintenance and repair). Thus, the proposed NVM measurements include actual noise that was excluded from the Noise Budget calculations. The proposed NVM measurements would also likely include noise from aircraft operating at nearby airports.

[2] There are sites in areas where no people live, and no sites are in areas where the 1989-90 annual average DNL used in the NVM baseline calculation was below 71 dB. Sites would seem to be needed that are representative of the impacted population, not just the severely impacted population; sites are needed where the DNL are in the 55-70 dB ranges, as well as where the DNL exceeds 70 dB. Because the current Noise Monitoring System is limited to sites very close to the Airport, the average NVM DNL of 74 dB, observed at the 11 RMS, does not reflect the lower levels of noise that are experienced by most of the impacted population.

- The POS has not demonstrated that data from the 11 monitoring sites are sufficient to confirm whether the ANEL noise reductions in the Noise Budget will be achieved.[3]

- The POS has not demonstrated that the arithmetic average of a set of monitored data (as used in the NVM) will give the same target reduction as an energy summation of the same data (energy summation is used in the Noise Budget).[4]

As a result, a revised NVM will be required.

We recognize, however, that the Resolution contemplates that objective measurements of on-the-ground noise will be used. This means that the POS will not be required to conduct surveys of residents in the affected communities to ascertain their subjective perceptions of Airport noise. This is not to say that such survey results would not provide useful information to the POS and the public, and to this Panel. We also acknowledge that the Resolution does not require the POS to reduce Airport noise to "acceptable" levels, whatever they may be. Rather, the Resolution only requires that the POS achieve a significant reduction in the real noise impacts. Busy jet airports, such as Sea-Tac, are inherently noisy, and it is unrealistic to expect that nearby communities would ever find the noise impacts generated by such airports to be "acceptable."

The question therefore becomes (a) what measures of noise impacts should be used (that is, what noise "metrics" should be selected), (b) where should the measurements of noise be made, and (c) how much reduction in noise, by these measures, must be achieved, and over what time period, to satisfy the requirements of the Resolution?

We turn first to the choice of metrics. We recognize, as the POS has urged, that DNL is a valuable tool, and we intend to give significant weight to reductions in DNL that are shown by the POS. However, we have concluded that the use of the DNL metric, by itself, is inadequate to show the required reduction in noise impacts because, taken alone, as an aggregate value it does not permit us to review the intensity, duration or frequency of single noise events or to consider when, during the day or night, they occur (even though all of these attributes contribute to the measured DNL).[5] As a result, we

---

[3] The ANEL includes calculation points at +60,000 and +90,000 feet from the start of take-off roll (as well as +30,000 from take-off roll and -20,000 feet from landing touchdown). However, the most distant RMS is only 29,000 feet from the start of take-off roll, and most of the 11 RMS are closer than the shortest distance in the ANEL (20,000 feet). Thus, assertions about differences among aircraft in arrival or departure noise at greater distances out from the Airport remain untested.

[4] The proposed NVM DNL goal is the arithmetic average of the annual energy-average DNL at the 11 RMS. The ANEL in the Noise Budget is the level of the sum (not the average) of the sound energies at four other points. If the NVM were to use the sum of the sound energies at the 11 RMS instead of the arithmetic average, the results will change slightly from what is currently shown in the NVM Report. While the difference would normally be of little consequence, the POS is presenting its ANEL goals with year-to-year reductions in the range of 0.2 to 0.4 dB. Also, as previously noted, the POS has not demonstrated that the reductions at the relatively close-in 11 RMS represent the reductions at more distant, yet impacted, sites.

[5] For example, a 3 dB reduction in DNL would occur if either (i) there were a 50% reduction in the noise energy generated by each aircraft using the Airport (but no change in the frequency of operations) or (ii) there were

(continued...)

encourage the POS to develop a method that supplements the use of DNL observations with various additional metrics (including sound exposure level (SEL), Time Above (TA) an appropriate sound level threshold, and unweighted sound pressure levels). The revised method should also explicitly report changes in the total number, as well as in the composition and day/night mix, of aircraft operations at the Airport. Unless the reduction in sound levels is more fully characterized than the use of only DNL allows, we will be unable to find that there has been a meaningful reduction in real on-the-ground noise impacts, as required by the Resolution.[6]

We turn next to the location of noise monitors. We have concluded that the use of measurements of on-the-ground noise from the existing Noise Monitoring System at Sea-Tac is, without more evidence, insufficient to show the required reduction in noise impacts because these measurements do not capture

---

[5](...continued)
no change in the noise energy generated by each aircraft, but a 50% reduction in operations in operations at the Airport. While these two changes would be equivalent in DNL terms, the impacts on the surrounding communities would be very different.

[6] Additionally, we have concerns over the manner in which DNL is currently measured. The currently installed 11 RMS report a DNL attributable to aircraft alone as well as a DNL capturing all the noise at a site. The proposed NVM has left open the option to use either of these levels. The Panel believes that the NVM should include both the total DNL and aircraft DNL, because of the following concerns.

First, the "total DNL," by definition, captures all noise at a site. Improper placement of an RMS hydrophone (or loss of its windscreen) could cause the RMS to measure high levels of nonaircraft noise that are not truly representative of what the people are experiencing on the ground. It is possible that the total DNL in the base period could be slightly, artificially and incorrectly high. Elimination of this problem in a subsequent evaluation year could result in a different (and lower) measured level that is not due to a reduction in aircraft noise. If nothing else, the background level will appear to be artificially high, making the increase over background artificially low and making the impact of aircraft noise seem less than it is in reality. Our visits to several of the RMS gave us the clear impression that some of the "community DNL" measured by the Noise Monitoring System and shown in the NVM Report were too high. We have already expressed concern in the hearings that the hydrophone noise floors are too high for accurate measurement of the background levels, which is of particular importance when computing the nighttime contribution to DNL. We raise these issues because we note that the difference between background and aircraft levels has been cited in several studies and by the public in the hearings as one influence on annoyance.

Another concern is that placement of a monitor could result in the capture of a high level of actual nonaircraft noise. If this noise is indeed representative of the ambient noise experienced by nearby residents, it should be measured. However, the goal of the Resolution is to show a reduction in *aircraft* noise. A very high level of actual background noise would make it difficult, if not impossible, for the POS to demonstrate future reductions in aircraft noise using the "total DNL" measure. On the other hand, if the nonaircraft noise measured by an RMS is not representative of what the nearby residents hear, the "total DNL" that is reported could be higher than what the people actually experience. This could occur, for example, if the RMS is on a pole at a height that exposes it to traffic noise from which residents at ground level are shielded due to terrain features. As a result, the POS might not be able to show the full extent of the reduction that has occurred where the people live.

A final concern is that we have not been convinced that the algorithms used by the Noise Monitoring System to assign noise to the "aircraft" noise category rather than the nonaircraft or "community" noise category are sufficiently reliable. Of particular concern is noise generated while the aircraft are on the ground, such as from taxiing, reverse thrust on landings and engine run-ups of all kinds. This problem would suggest that it is more appropriate to base an evaluation on the total noise measured at the RMS.

significant aircraft-generated on-the-ground noise beyond the immediate periphery of the Airport. We encourage the POS to expand the Noise Monitoring System so that it is capable of collecting on-the-ground noise measurements at a variety of additional locations throughout the affected communities. At a minimum, we would like to see the POS to collect on-the-ground noise measurements at six additional remote monitoring sites. These should include sites beyond the boundaries of the predicted 65 dB DNL contours (with the most recent available Noise Exposure Map input data being a reasonable guide), both farther out along major flight corridors and farther out to the east and west of the Airport.[7] As part of a revised NVM process, the POS should propose a detailed measurement plan that demonstrates a measurement sampling strategy which produces statistically acceptable representations of the annualized DNL and any other descriptors developed for the revised NVM. We feel that it is important for the POS to show us that noise impacts have been reduced where the affected population lives and where noise sensitive land uses, especially schools, are located.[8]

We turn last to the required reduction in noise impacts. This is the most difficult question. We have determined that under the Resolution, the POS has the burden of showing that whatever reduction it has achieved by 1996 is significant and meaningful in the sense that residents of the affected communities could, or should, appreciate it. It is not for us to say exactly what metrics the POS should use, or precisely how large a reduction in sound levels it must prove. Rather, the POS must show us (i) that it has articulated an appropriate standard for judging whether the reduction in noise impacts is sufficient, and (ii) that by that standard, the POS has achieved the required reduction. We do note, however, that we are not convinced that the FAA threshold for considering increases in sound levels to be significant for certain regulatory purposes (+ 1.5 dB increase in annual average DNL) is a satisfactory benchmark for our use in judging whether the *reduction* in real on-the-ground noise impacts achieved by the POS satisfies the requirements of the Resolution.[9]

---

[7] We note that the POS' *FAR Part 150 Noise Compatibility Program Amendments of 1993* already call for evaluating the adequacy of the monitoring system. This work was to be initiated in 1994, yet we heard nothing about its progress at the hearings. We note, however, that both the POS and various representatives of the public mentioned in the hearings and in the written submittals a variety of potential new sites that warrant consideration.

[8] We also feel that it would be useful if the revised NVM included a plan for periodic, independent spot-check sound level monitoring and for more frequent visual verification of RMS condition. It would be useful if the spot checking included comparisons with the RMS data on an event-by-event-basis to determine any discrepancies in the RMS measurements of aircraft-only noise, background noise, and maximum level or SEL of events. It would also be useful if the spot-check equipment was capable of accurately measuring the minimum background noise levels at each site. Additionally, it would be desirable for the POS to file with the PSRC monthly monitoring results reports, complete with statistics on the data and annotation of all potentially spurious data. Finally, an independent review of the records of the past field visits to the RMS that could identify the extent and effect of any recorded problems, as well as an evaluation of the current sites and the RMS' condition, would also be useful.

[9] The purpose of the FAA's threshold (in areas where the DNL is already above 65 dB) is to determine when further analysis is necessary; not to deem that a significant impact has automatically occurred. A 1.5 dB DNL increase could result from an imperceptible 1.5 dB increase in the SEL of each aircraft or a very perceptible 40% increase in the number of operations. Likewise, an introduction of operations to an area previously without them could raise the DNL by 1.5 or more dB and generate substantial community reaction. A good local example of the latter was the reaction to the Four-Post Plan in areas beyond the 65 dB contour, where 3 dB increases in DNL were predicted by the POS noise consultant. The FAA threshold for further analysis is a signal to investigate the cause of the DNL increase, and to ascertain whether that *cause* has significant impact.

(continued...)

We have also determined that 1993 is the appropriate base year for purposes of the measuring whether the reduction in noise impacts required by the Resolution has been achieved. Nothing in the Resolution speaks to noise reductions that occurred before the Resolution was enacted.[10] Thus, as we read it, the Resolution requires the POS to show that there has been a significant reduction in on-the-ground noise impacts from 1993 to 1996, when the construction of the third runway may be authorized by the PSRC.

We are not insensitive, however, to the practical problems our interpretation of the Resolution may create for the POS. Most prominently, the requirements that the POS employ additional noise metrics and monitoring stations, and that it show a reduction in noise from 1993, will inevitably require the POS to back-calculate or otherwise estimate some of the required inputs. While this may introduce some imprecision into the exercise, we have concluded that it is preferable to using only DNL data from the existing Noise Monitoring System for past years or limiting the analysis entirely to future noise reductions. The Panel believes, however, that the significance of the 1993-96 data will be best understood in the context of as much earlier data as the POS can make available to us.

---

[9](...continued)

We also note that the 1992 FICON *Federal Agency Review of Selected Airport Noise Analysis Issues* submitted to us by the POS compiles a variety of other thresholds articulated by various people for various purposes. FICON suggests that "percent of people highly annoyed" (%HA) is a good indicator of environmental quality, with reference to Finegold's work and the revised Schultz curve. In the hearings, the POS noise consultant also referred to %HA citing values from the curves in the 1992 FICON review. He noted that the POS' proposed 4.4 dB reduction in average DNL by 2001 would reduce %HA by 40 or 50%. We note somewhat different values: a 50% reduction in %HA (such as from 20% to 10%) would actually require a 6 dB reduction in DNL according to the curves. The POS consultant also referred the Panel to the 1991 Fidell article (*JASA*, 89/1, pp. 221-233), which presents the "revised Schultz curve;" this curve shows that a 4.4 dB decrease in DNL would reduce the %HA by about 25%; to achieve a 50% reduction in %HA, according to the revised Schultz curve, a 9 dB decrease in DNL would be required.

We also note that A. Harris in a December 23, 1994, letter to the Panel and in his 1990 *Review of Community Responses to Changes in Noise Exposure*, submitted to us by the ACC, suggests that determination of differences in the number of impacted people represented by each study point is key to assessing the effectiveness of a change in the noise climate, coupled with changes in noise exposure and single event levels.

Further, the POS consultant noted that Fidell had reaffirmed the idea that the use of a single curve representing all transportation sources was valid. A. Suter, in her review prepared for RCAA for the hearings, disagreed, citing many recent references not addressed by Fidell or by FICON. She pointed to data that would raise the %HA for 70 dB DNL from the 20-30% range to over 70%. Also, a second Fidell article provided to us by the POS consultant (*JASA*, 89/1, pp. 234-243) showed a 5 dB "shift" in tolerance of aircraft exposure compared to nonaircraft exposure (people being less tolerant of aircraft noise, and so, more likely to be highly annoyed by a given aircraft DNL than by nonaircraft sources such as road traffic).

We believe all of these references offer insight into the significance of changes in noise exposure and DNL.

[10] It seems implausible to us the Resolution would be satisfied if a meaningful reduction in noise impacts occurred between 1989 and 1993, but noise impacts were aggravated from 1993 to 1996.

As we have said, we do not believe that it is our responsibility to specify exactly how the POS should meet its burden of showing that the required reduction in on-the-ground noise impacts has occurred. Rather, it is our role to indicate, in general terms, why the Noise Validation Method, as it has been proposed by the POS, is not adequate, and what sorts of additional considerations should be taken into account. We have attempted to do so in this Order. We leave it to the POS, and its consultants, to develop and articulate a new method of making the required showing to us.

We do not believe that we have any authority to compel the POS to adopt any particular approach to the reduction of on-the-ground noise impacts. We do feel, however, that it might be useful for the POS (in conjunction with the FAA, where appropriate) to consider a variety of measures for both noise abatement (reduction of total sound energy at the source) and noise mitigation (reduction of noise impacts). With regard to the programs that were deemed to be "responsive" in Part III.A of the Implementation Steps adopted by the Executive Board of the PSRC, we offer these comments:

- Acoustical insulation program: Based on testimony at the hearings (and subject to our reevaluation after review of the data requested in the Attachment to this order), we are concerned that the acoustical insulation program does not appear to be meeting at least one of its stated goals, which is a 5 dB reduction in A-weighted DNL in the treated houses. The POS also appears not to be meeting its design goals for each individual house for additional Noise Level Reduction after insulation. Additionally, a 5 dB reduction in overall A-weighted DNL may be too modest a goal for meaningful reduction in interior noise due to aircraft, especially in the lower frequencies.[1] Meaningful noise reduction due to sound insulation may need to address this low frequency noise. Independent, periodic and statistically supportable measurements of a representative sample of the insulated homes before and after treatment would be useful.

- Run-up noise reduction program: Based on our review of the data provided by the POS, we are concerned that the nighttime engine run-ups may regularly violate the King County Noise Ordinance, and perhaps by substantial amounts. Full POS compliance with the King County

---

[1] Wyle Research notes on page 2-5 of its *Guidelines for the Sound Insulation of Houses Exposed to Aircraft Noise*, provided to the Panel by the POS, "Modest improvements . . . (e.g., less than 5 dB) may not provide a noticeable improvement to the homeowner and hence are not cost effective." Further, on page 2-6, Wyle Research notes, ". . . the FAA has recognized that in order for a homeowner to perceive any improvement . . . there must be a *minimum* of 5 dB improvement in noise reduction in each room" [our emphasis]. Wyle Research also notes that interior SEL goals of 60-65 dB may also be appropriate in areas within the 65 dB exterior DNL zone.

Additionally, as the POS noise consultant indicated in the hearings, the reduction in A-weighted DNL is caused solely by a reduction in maximum A-weighted levels (and SEL) of individual aircraft. We suspect that this reduction is probably driven by a reduction in the more easily attenuated frequencies near and above 1000 Hz, with perhaps little or no reduction in the more difficult-to-reduce lower frequencies (which are heavily attenuated in the A-weighted calculation). It is these lower frequencies that seem to be the cause of much of the complaints about interior noise impacts (including window rattle). A 5 dB reduction in overall A-weighted level from an individual flyover may not be sufficient to be viewed by residents as a meaningful improvement. Even an 8-10 dB reduction in overall A-weighted level, which would typically considered as substantial, may not adequately solve the low frequency noise, vibration and rattle problems.

Finally, POS data provided to the Panel by the Pork Patrol (*Final Project Report, Summary of Test Results, AIP 3-53-0062-13*) shows many cases where the actual measured "additional sound reduction after insulation" was less than the "designed additional sound reduction".

Noise Ordinance for all run-up activities covered by the Ordinance would seem to be appropriate. In addition, whatever abatement measures the POS uses to reduce regulated run-up noise (such as a hush facility) might usefully be applied to the exempt daytime and nighttime operations as well. We would suggest that the POS demonstrate compliance with the Ordinance through measured data at appropriate measurement points in the residential areas surrounding the boundaries of the Airport. We would further suggest that independent measurements be made by trained County staff or by an independent consultant hired by the PSRC. We would encourage the POS to include in the revised NVM a plan to use measures other than mere compliance with the Ordinance and the run-up noise reduction program, such as sound level measurements and operational data, to demonstrate that meaningful reductions in ground run-up noise have occurred.

With regard to other programs or measures that were not listed in Part III.A of the Implementation Steps, we would suggest that the following be considered:

- Evaluate and, if feasible, implement alternative flight paths designed to minimize the population exposed to maximum noise levels or to redistribute the burden of maximum noise levels throughout the surrounding communities.[12]

- Consider and, if feasible, implement revised flight operating procedures to increase the angle of ascent/descent for jet aircraft at the Airport, to reduce on-the-ground noise levels along the flight paths and at the corner posts.

- Implement a high-priority program to install, by the end of CY 1996, sound insulation in all elementary and secondary schools within the 65 dB DNL contour sufficient to reduce sound levels in classrooms due to aircraft to a maximum level and duration that will eliminate speech interference.[13]

---

[12] We note that in Resolution A-93-03, the PSRC specifically requested "consideration by the FAA of modifying the Four-Post Plan to reduce noise impacts . . ." We also make note of the discussions in the December hearings that the FAA has invited the local communities to be involved in the process of evaluating flight path shifts. While such involvement has the potential to pit one community against another, we feel that careful examination of shifting the "posts" and perhaps narrowing the approach and departure corridors outside the posts could produce a worthwhile net benefit in noise exposure. It is clearly in the best interest of the POS, the PSRC and the citizens to pursue vigorously this option.

[13] We note, according to the 1992 FICON airport noise analysis review, that 60 dB is given as the level above which "there will be interference with speech communication." We also note that in the FAR Part 150 Amendments of 1993, the POS called for a planned pilot program on sound insulation of two churches, one private school, one convalescence home and one multi-family structure. We suggest that there is enough evidence nationwide of successful noise insulation activities that a pilot program is unnecessary and that full implementation of a public use/multi-family structure noise insulation program could begin immediately. We also believe that special emphasis should be put on schools and convalescence facilities in this program.

At a minimum, we believe that it would be very useful for the POS to complete the pilot program by mid-1995, as the POS anticipated in the Part 150 Amendments, and that a regular public use/multi-family structure insulation program could be well underway by April 1996, with a detailed schedule for completion, including documentation of which facilities are eligible, which are not (and why not), and the insulation goals.

- Further accelerate the residential sound insulation program.[14]

- Evaluate the feasibility of new technologies to reduce ground noise generated by jet engine run-ups and, if feasible, adopt new methods of doing so.

- Evaluate the feasibility of setting a cap on total nighttime operations and, if feasible, implement such a cap.

- Evaluate the feasibility of shifting nighttime operations to earlier in the evening or later in the morning and banning all operations for a core period in the middle of the night; and, if feasible, implement these measures.

- Evaluate the feasibility of setting a maximum noise limit (SEL or L_{max}) for aircraft operating during the nighttime hours, and, if feasible, implement such a limit.[15]

We recognize that in its efforts to limit and reduce the impact of aircraft-generated noise on its neighbors, the POS has been a leader within the airport industry. The POS has expressed confidence that through its innovative Noise Budget and Nighttime Limitations Program, and various other efforts, it is in fact significantly reducing the impact of on-the-ground noise. We invite the POS to show us why the community should share the POS's confidence in the significance of its on-going noise abatement and mitigation programs.[16]

The POS should submit a revised noise validation method to the PSRC, for delivery to us and for public inspection, by March 31, 1995. Any member of the Coordinating Committee or of the public who wishes to offer comments on the revised method submitted by the POS should submit written comments to the PSRC, for delivery to us, by April 14, 1995. We expect to convene a public hearing, to consider the POS's submission and responses from the Coordinating Committee and the public, during the first week of in May 1995. We will, in due course, issue an order specifying the time and place of such a hearing.

In anticipation of our review of a revised noise validation method, the Panel believes that it would be helpful if the POS could provide us with the technical information specified in the attached Information

---

[14] We note that the POS FAR Part 150 Amendments of 1993 indicate that 7,500 single family residences are eligible for sound insulation and that the POS has accelerated the program to 100 houses per month. Even with this acceleration, completion of the program will take until 2001.

[15] We note that Section 4.C of the Nighttime Limitations Program calls for the POS to specifically determine, after 1997, "with input from the carriers and the public whether [such a limit] . . . is appropriate and consistent with its obligation as an airport proprietor." We see no reason why this decision should be put off so long.

[16] We note that the data in Table 17b of the POS response to our September 1994 data request shows a 2.9 dB drop in measured DNL at the 11 RMS from 1991 to 1994 YTD (and a corresponding 2.7 dB drop in the related ANEL), which already exceeds the *1998* DNL goal in the NVM Report (and the 1999 goal in the Noise Budget). The NVM Report showed that from 1991 to 1994, the DNL had to drop 1.0 dB, corresponding to a 0.76 dB decrease in ANEL.

Request to the Port of Seattle by submitting the requested information to the PSRC, for delivery to us, by February 28, 1995.

We want to reiterate here a final comment that we offered on the Noise Issues at the conclusion of the hearing on December 2. Throughout this proceeding, the public has attempted to draw to our attention the consequences — particularly the noise impacts — that might occur if a third runway were built at the Airport. We again observe that this Panel cannot and will not undertake a review of the potential environmental consequences of building the third runway. Our responsibility, with respect to the Noise Issues, is limited to determining whether the POS has scheduled, pursued and achieved a meaningful reduction in real noise impacts at the existing Airport.

—

We will soon issue a separate order laying out the next steps for our consideration of Demand/System Management Issues.

Scott P. Lewis, Chair

William Bowlby

Martha J. Langelan

Date: January 9, 1995

Attachment 1 to January 9, 1995 Order on Phase I Noise Issues

INFORMATION REQUESTS TO THE PORT OF SEATTLE

The Panel respectfully requests that the Port of Seattle (POS) and its consultants provide the following information. We ask that each item's information be provided when ready rather than waiting until all items are ready.

1. Please provide the following data on the sound insulation program:

   a. full details on the noise measurement test program for sound insulated homes, including how many have been tested, how many are tested each quarter, how the houses to be tested are chosen, and who conducts the measurements and the data analysis;

   b. measured sound level data for all insulated houses that have been tested; please provide this data separately in terms of sound exposure level (SEL) and maximum level outdoor-to-indoor Noise Level Reduction before and after treatment for these houses; for a representative sample, please show octave band (or 1/3 octave, if available) sound pressure levels (SPL) and A-weighted levels, plus overall SPL and A-weighted level for the same data;

   c. an explanation of the measurement procedure and sampling strategy for each test, including the number of samples, types of aircraft and operations represented by the data, aircraft positions relative to the house during the test, and a map locating the houses represented in the submitted data;

   d. a sample actual calculation from the field-measured data of the resultant Day-Night Level (DNL) reduction;

   e. the mean overall A-weighted sound level change for all insulated houses, the mean Noise Level Reduction for the houses, and the mean cost per house (with plus/minus one standard deviation for all means); please indicate the number of samples used in the calculation of the mean(s);

   f. the total number of insulated houses, the number yet to be treated, and the schedule for treating the remaining houses

   g. the total number of elementary and secondary schools and convalescence facilities within the existing noise mitigation zone.

2. Please provide tables of statistics on measured DNL at the 11 remote monitoring sites, showing for each site for each year since (and including) 1989:

a. mean measured TOTAL DNL at a site for the year (and the number of days in the calculation), plus/minus one standard deviation, 95% confidence limits, and frequency distribution histogram (in one decibel increments) for the year;

b. mean measured AIRCRAFT-ONLY DNL at a site for the year (and the number of days in the calculation), plus/minus one standard deviation, 95% confidence limits, and frequency distribution histogram (in one decibel increments) for the year.

3. Please provide a table summarizing the statistical significance (at the 5% level of significance) of the differences in the means in item 4 above (by site, separately for TOTAL and AIRCRAFT-ONLY) *for 1989* compared to each year; please indicate the statistical test used to test significance and show the relevant calculated evidence of significance.

4. Please provide a table summarizing the statistical significance (at the 5% level of significance) of the differences in the means in item 4 above (by site, separately for TOTAL and AIRCRAFT-ONLY) *for each year* (starting in 1989) compared to each subsequent year; please indicate the statistical test used to test significance and show the relevant calculated evidence of significance.

5. Please provide a table summarizing the statistical significance (5% level of significance) of the difference in the mean DNL (averaged over the 11 sites) *for 1989* compared to each year; please indicate the statistical test used to test significance and show the relevant calculated evidence of significance.

6. Please provide a table summarizing the statistical significance (5% level of significance) of the differences in the mean DNL (averaged over the 11 sites) *for each year* (starting in 1989) compared to each subsequent year; please indicate the statistical test used to test significance and show the relevant calculated evidence of significance.

7. Please provide corrections to Table C-78 et al. of the *Flight Plan Project FEIS* for the population in the 80 dB SEL contour for Alternatives 1, 33, 34 and 35. Please provide an explanation of any differences in the SEL population trends between Alternative 1 and the other alternatives compared to the DNL population trends in the same tables.

8. The December 14, 1994 letter from Mr. Dunholter to Ms. Summerhays referred, on the 3rd page, 3rd full paragraph, last sentence, to other current research that replicates the British findings on sleep interference. Please provide citations and abstracts/conclusions from these works. The 12/7/94 letter to the panel from Mr. Peter Townsend of the Federal Way Chapter of the RCAA offered to provide a critique of this British study. We request that Mr. Townsend be asked to provide the critique.

9. At the December hearing, Mr. Dunholter showed a chart comparing DNL and complaints received by the POS. Please send us a copy of that chart and any relevant back-up information.

10. At the December hearing, Mr. Wells of the POS noted that 1-second data from the Noise Monitoring System has been stored for about a year. He also noted that, in the past, SEL data

was not generally recoverable unless the system "was set to generate SEL numbers" which "is not routinely done."

a. Please specify the times periods, if any, in the past during which the system was set to generate SEL data, perhaps for special studies that were being conducted; to the extent that such past SEL data is available (regardless of whether or not it can be correlated to specific events), please provide tables summarizing this information in 5 dB increments (number of events in each 5 dB range) for each period measured.

b. Please indicate the exact period(s) for which the more recently collected 1-second data is available.

c. Please use a sample of the 1-second data to present the SEL for one departure event that was measured at all (or a major portion) of the RMS locations and the correlated nonnoise data on the event, describing briefly the process used to identify the event and to then obtain both the noise and nonnoise data.

d. Please use another sample of the 1-second data to present the same information for a maintenance or repair ground run-up for a Boeing 727.

e. Please indicate how the capabilities have changed since the recent addition of the new software, and illustrate the same type of event identification and analysis.

f. Please provide a sample histogram of SEL (in 2 dB increments) at RMS #5 for a typical day using the new software's capabilities and showing if and how ground run-up events are included; please show the corresponding operations data for that same day, correlating events to SELs.

11. We ask the POS to request a letter from King County giving the County's interpretation of the County Noise Ordinance as it relates to the Airport ground noise. In particular, we are interested in the daytime exemption from 7 a.m. to 10 p.m. and the special exemption from 6 a.m. to 7 a.m. (as mentioned in the March 1994 POS *South Aviation Support Area FEIS* on pages 4-37, 4-66 and 4-73).

12. We would like a response to the following observations:

The fleet mix used in the ANEL-to-DNL conversion in *Noise Validation Methodology in Compliance with PSRC Resolution A-93-03* ("the NVM Report") was said to represent a mix designed to give the maximum possible DNL reduction for a given ANEL reduction. The report showed that from 1991 to 1994, the DNL should drop 1.0 dB, corresponding to a 0.76 dB drop in ANEL.

Yet, Table 17c of the POS Response to our September 1994 data request shows that, *based on the actual 1994 YTD (year-to-date) operations*, a 3.6 dB reduction relative to 1991 should have occurred using the NVM formula. While ANEL is not shown in Table 17c, we

would expect the related ANEL difference from 1991 to 1994 YTD to be over 3 dB. Both the NVM DNL and the ANEL reductions computed from the 1994 YTD operations data are radically different from the forecast 1.0 and 0.78 dB reductions in the NVM Report.

At the December hearing, Mr. Bryant of the POS attributed the larger decrease to the nighttime Stage II limitations program phase-in at the end of 1992. The Panel wonders why this effect was not accounted for in the calculations in the NVM Report if, as stated, the Report used fleet mixes designed to give the maximum DNL reduction. Is it simply the fact that the airlines' Stage III conversion was much more rapid than they were willing to agree to in the Noise Mediated Agreement?

Also, the actual measured data in Table 17b of the POS Response to our data request shows a 2.9 dB drop in measured DNL at the 11 RMS from 1991 to 1994 YTD (and a corresponding 2.7 dB drop in the related ANEL). Are we correct in interpreting this result as meaning that the POS is already exceeding the *1998* goal for DNL in the NVM Report, as well as the 1996 goal upon which the POS has proposed that we base our decision. (It appears that the reduction also exceeds the 1999 goal for ANEL in the Noise Budget.) Should the Panel interpret these results to mean that the goals in the NVM were much too modest? Should we expect a reduction through 1996 that follows the trend from 1991 to 1994?

13. Please describe the procedures the POS would use to determine (i) where additional noise monitoring sites should be located, and (ii) how many additional sites would be appropriate, if the existing Noise Monitoring System were to be expanded to provide a better population-emphasized basis for evaluating on-the-ground noise impacts.