SCHOMER AND ASSOCIATES

ASSESSMENT OF AIRPORT NOISE MONITORING AT HULL, MA

May 31, 2001

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I. INTRODUCTION

1. Background

The Massachusetts Port Authority (Massport) operates Boston's Logan Airport (Logan). As part of this operation they have created a noise office. One of the functions of this noise office is to operate a large set of noise monitors that are distributed throughout the vicinity of Logan. One of these monitors is located by the high school in Hull and about 67 ft from the water's edge.[1] Figure 1 shows the position of the high school in Hull and Figure 2 is a picture of the monitor looking towards the school.

The microphone of a noise monitor "hears" all the noise that is present at a site. In general, this includes both airport noise and non-airport noise. Non-airport noise generally includes all noise except for noise from aircraft arriving to or departing from the airport. In general, this includes traffic, industrial and neighborhood noise. Non-airport noise can even include transient aircraft that are not arriving from or departing to the airport. One non-airport noise can be the pseudo-noise generated by wind and another, at this site, can be wave noise.

Separating the desired noise from all other noise in an unattended monitoring situation is always a challenge and a tradeoff. One can be very "conservative" and establish criteria such that little or no non-airport noise is included in the airport total. However, the result of a very "conservative" strategy is to systematically exclude some airport noise. On the other hand, one can be very "liberal" and include all or nearly all noise. The "liberal" strategy insures that all airport noise is included in the total. However, the "liberal" strategy systematically includes some non-airport noise. Like in any decision theory, the optimum point is where the systematic errors cancel. Such an optimum point will include some non-airport noise in the total. But it will also fail to include some airport noise. Ideally, these biases will cancel. Some, such as Schomer *et a*l. (2001), have developed expert systems to accomplish this task.

[1] Including a 5 ft high, 2.5 ft wide seawall

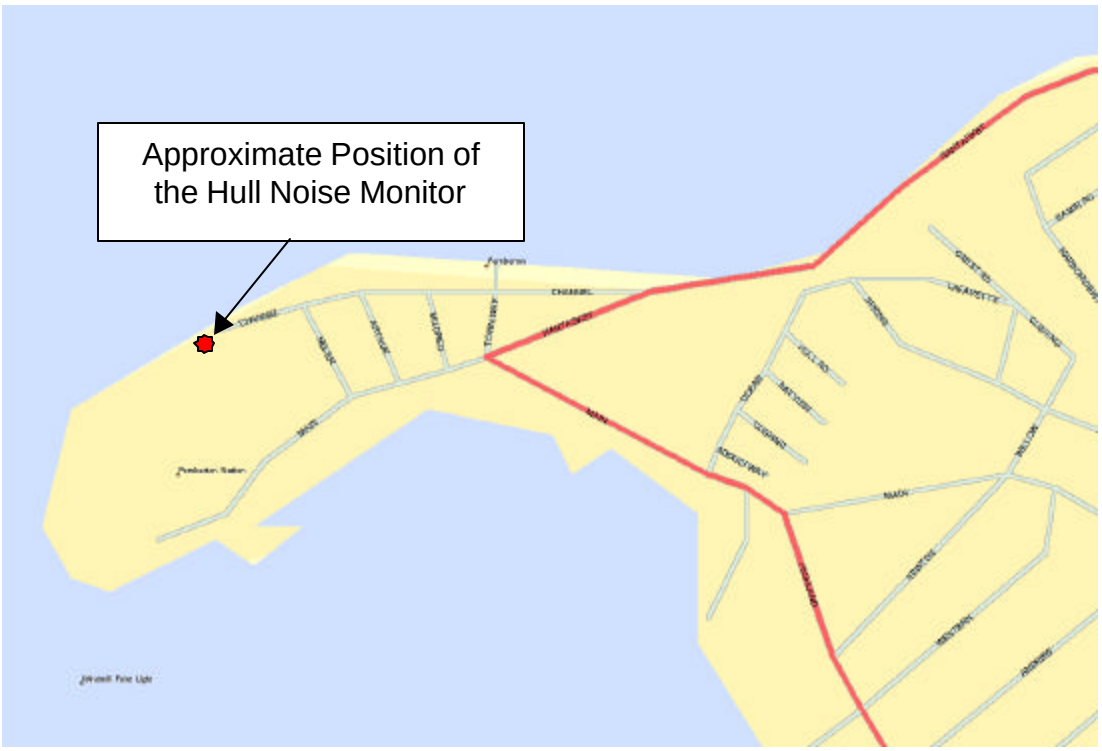

Figure 1. Approximate position of the Logan noise monitor at the tip of the Hull peninsula

Figure 2. The Hull noise monitor looking towards the high school

With respect to the monitor at Hull, it is acoustically well situated. It is far from busy roadways, industrial noise sources, and other sources of acoustical noise. However, this monitor can be subject to wind induced noise or wave noise.

The noise office at Logan has developed methods to separate "just airport noise" from the total noise measured by their monitors. Typically, at Hull, this method results in airport only noise levels that are about 4 dB less than the total noise level measured by the monitor. Nearly all of the excess noise is attributed to wind noise and wave noise. The noise office at Logan indicates that their method, especially at night, is to search for hours when the L90 (the sound level exceeded 90 percent of the time) exceeds 55 dB. This level, 55 dB, is chosen because the monitor at Hull is set to include events such that the maximum level exceeds 65 dB. The noise office removes the hourly LEQ data from the calculation for those hours for which the L90 exceeds 55 dB. In addition, if the L90 for one-quarter of the total day (some combination of 2 nighttime hours and/or 4 daytime hours) exceeds 55 dB then the hourly LEQ data for the entire day are removed.

2. Purpose

The purpose of this paper is to examine the efficacy of the Logan noise office strategy. The Logan noise office has been kind enough to supply a sampling of data from the Hull monitor along with ancillary data. They have supplied the monitor data for every twelfth day throughout a year. Every twelfth day was chosen so that all days of the week would be equally sampled and so that the sampling would span short-term weather fronts. The noise monitor data include single events and hourly equivalent levels (LEQ). The single events are such that the maximum level exceeds 65 dB and the duration exceeds 10 seconds. The hourly data also include the L1, L10, and L90 levels. The monitor data also include information on wind speed and wind direction at the monitor. The ancillary data include weather observations at the airport throughout the day, and each change in runway configuration.

II. SINGLE EVENT DATA

Table 1 contains the DNL calculated for each sampled day based on the single-event data and on the hourly LEQ data. Obviously, some days contribute much more than others to the total noise. For purposes of brevity and simplification, this analysis concentrates only on the louder days, the days shown in bold in Table 1. The days considered are such that the DNL attributable to the single events exceeds about 58 DNL, a value that is 5 dB below the energy average for the entire sampling period. Days for which the DNL is less than 58 dB contribute little to this energy average of 62.9 dB.

As examples, Annex A contains the single-event data for the first 3 bolded days delineated above, for December 15 and for February 5. Each table in Annex A contains the changes in runway configuration, the airport weather observations and the single-event data measured at the Hull monitor—all in chronological order for a single day. Runway configurations that include landings on Runway 33L are designated "landing" configurations with respect to Hull. Runway configurations that include takeoffs on Runway 22L or 22R are designated "takeoff" configurations. Occasionally, "both" takeoffs (Runway 22L and 22R) and landings (Runway 33L) are present at the same time. Even less frequently, neither landings nor takeoffs are active in the direction of Hull when single events are registered on the Hull monitor. Table 2 contains the summary data for single events on the "loud" days registered at the Hull monitor. For each day, this table contains the number of events registered during landing conditions (Runway 33L active for landings), the number registered during takeoff conditions (Runway 22L and/or 22R active for takeoffs), the number registered during "both" conditions (Runway 33L active for landings and Runway 22L and/or 22R active for takeoffs), and the number registered during "other" conditions (neither takeoffs nor landings active over Hull).

The data in Table 2 can be used to infer wind effects. If there are significant wind-only data then there should be many single events when neither landings nor takeoffs were active over Hull—the "other" condition. But this is not the case. With the exception of February 5, there are only 16 "other" events out of over 3000 events. This fact alone indicates that except for February 5, the Hull monitor only registered single events when aircraft were active over Hull. Therefore, all of the single-event data, except for some of the data on February 5, are attributable, at least in part, to airport operations.

Day	DNL Based on Single-Event Data	DNL Based on Hourly LEQ Data
6-Apr-00	**61.1**	**65**
18-Apr-00	45.1	63.7
30-Apr-00	56.2	61.6
12-May-00	**61.8**	**64.1**
24-May-00	40.7	59
5-Jun-00	54	60.1
17-Jun-00	**61.2**	**63.8**
29-Jun-00	**59.6**	**61.8**
23-Jul-00	56.9	60.7
4-Aug-00	56.6	59.2
16-Aug-00	**61.3**	**63.6**
28-Aug-00	56.2	60
10-Sep-00	52.9	59
22-Sep-00	**63.4**	**65.6**
4-Oct-00	**61.7**	**64.4**
16-Oct-00	50.2	62.6
28-Oct-00	69.9	
9-Nov-00	56.5	61.8
21-Nov-00	**62**	**65.7**
3-Dec-00	55.8	63.4
15-Dec-00	**62.3**	**67.2**
27-Dec-00	**65.5**	**69.9**
12-Jan-01	56.5	61.2
24-Jan-01	**59.8**	**62.3**
5-Feb-01	**72.7**	**73**
17-Feb-01	**70.6**	**71.3**
1-Mar-01	57.7	62
13-Mar-01	**59.2**	**62.8**
25-Mar-01	**60.9**	**64.9**
Energy Average	**62.9**	**65.3**

Table 1. Daily DNL data measured by the Hull noise monitor based on single-event and hourly data as indicated. The bold indicates the louder single-event days. These were selected for further analysis.

The duration of the single-event noise blocks and the shear number of blocks can also be used to infer wind effects. February 5 is already noted as windy by the above test. This day also exhibits many single-event noise blocks where the duration of some blocks is minutes or even 10s of minutes long. Aircraft do not create long noise blocks; aircraft noise blocks are only 10 to 40 or 45 seconds long. So hours containing long-duration noise blocks include wind or other non-aircraft noise. In addition to February 5, February 17 contains several to many long-duration blocks during some hours of the day, and December 27 contains a very few long-duration blocks. No other day has long-duration single-event noise blocks as a part of its data.

Number of events also can be an indicator of wind or other non-airport noise. The February 17 data include 802 single events and the December 27 data include 567 single events. These numbers of events are on the high side—they indicate the presence of wind or other non-airport noise. (February 5 does not have such a large number of events only because it has so many long-duration events.) None of the other days listed in Table 2 exhibits an abnormally large number of single events.

Day	Landings	Both	Takeoffs	Other	TOTAL
6-Apr-00	7	10	108	2	127
12-May-00	49	0	72	1	122
17-Jun-00	165	0	57	0	222
29-Jun-00	0	0	35	3	38
16-Aug-00	21	0	102	4	127
22-Sep-00	136	22	106	0	264
4-Oct-00	179	0	38	0	217
21-Nov-00	0	9	179	0	188
15-Dec-00	64	0	7	5	76
27-Dec-00	562	0	0	0	562
24-Jan-01	102	0	16	0	118
5-Feb-01	13	0	0	303	316
17-Feb-01	802	0	0	0	802
13-Mar-01	0	0	13	1	14
25-Mar-01	117	18	41	0	176
Totals excluding February 5	**2204**	**59**	**774**	**16**	**3053**

Table 2. This table shows the number of events registered during landing conditions (Runway 33L active for landings), the number registered during takeoff conditions (Runway 22L and/or 22R active for takeoffs), the number registered during "both" conditions (Runway 33L active for landings and Runway 22L and/or 22R active for takeoffs), and the number registered during "other" conditions (neither takeoffs nor landings active over Hull).

III. HOURLY LEQ DATA

The Hull noise monitor hourly data include the various acoustical measures cited above along with the average wind speed. Figures 3, 4, 5, and 6 plot the hourly LEQ versus hourly average wind speed for LEQ, L1, L10, and L90 data, respectively. Each of these figures contains two regions. In each figure, at lower wind speeds, the levels are independent of wind speed, and at higher wind speeds, the average levels increase with wind speed. The region in each figure where the levels increase with wind speed are being affected by wind noise. This wind effect is significant only when the level begins to exceed the levels at low wind speeds by more than a decibel or two. That is, for example, if 64 dB occurs at low wind speeds, then 64 dB cannot be eliminated just because the wind is higher. In Fig. 3, this wind criterion is met when the LEQ exceeds 64.5 dB; in Figure 4, when the L1 exceeds 76.5 dB; in Figure 5, when the L10 exceeds 67.5 dB, and in Figure 6, when the L90 exceeds 56.5 dB.

One can test the consistency of these 4 wind criterion levels by plotting the data against each other. Figures 7, 8 and 9 contain the hourly L1, L10 and L90 data plotted versus the hourly LEQ data. Each of these 3 figures contains a “cloud” of valid data and a “straight line” region where wind noise appears to dominate. In Figure 7, the “cloud” ends when L1 exceeds 76.5 and LEQ exceeds 64.5 dB. In Figure 8, the “cloud” ends when L10 exceeds 67.5 and LEQ exceeds 64.5 dB. In Figure 9, the “cloud” ends when L90 exceeds 58 dB and LEQ exceeds 64.5 dB. The numbers generated by Figures 7, 8, and 9 are completely consistent with the numbers generated by Figures 3, 4, and 5. The only discrepancy is with Figure 6. Figure 6 suggests a criterion value for L90 of 56.5 dB while Figure 9 suggests a criterion value for L90 of 58 dB.

Actually, this inconsistency may be irrelevant. The DNL for aircraft dominated noise should be rather insensitive to minor changes in L90. It would appear that the “wind” criterion should be based on LEQ since this criterion level of 64.5 dB correlates well with each of the other criterion and since the DNL is definitely sensitive to the LEQ. It is suggested that a proper wind criterion is an hourly LEQ of 64.5 dB. When the hourly LEQ exceeds 64 dB, then the levels are, at least in part, corrupted by wind noise. However, normally, at least some of the noise is aircraft noise. Therefore, it seems reasonable to replace each hourly LEQ that exceeds 64 dB by a level of 55 dB. This includes a small fraction of the sound energy that should be attributable to aircraft noise while excluding a large fraction of the sound energy that should be attributable to wind or wave noise.

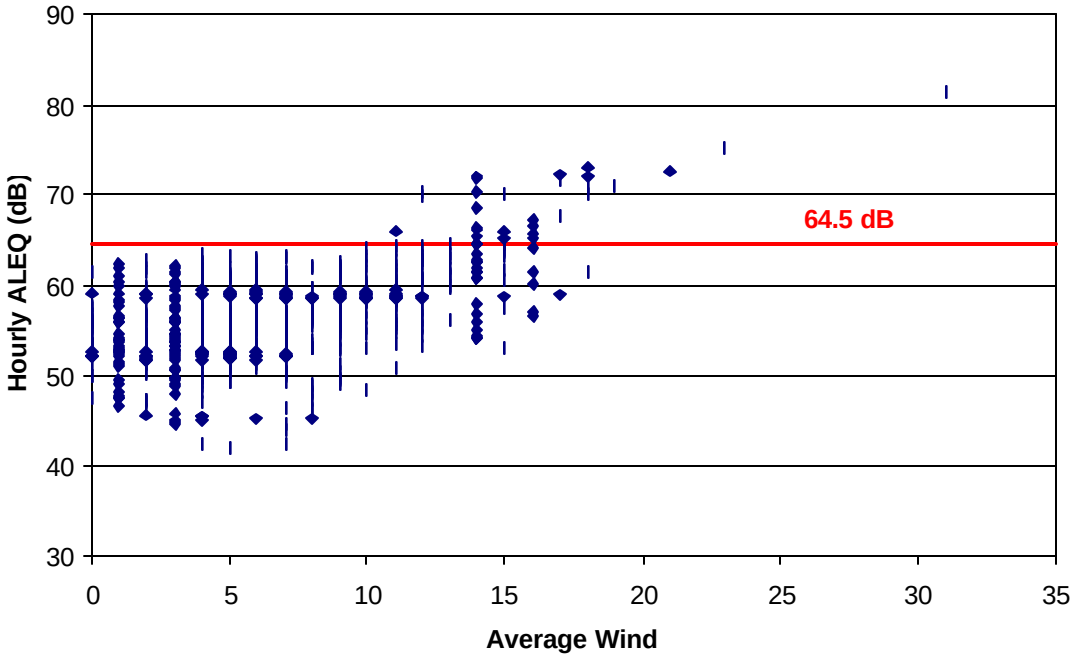

Figure 3. Hourly ALEQ versus average hourly wind speed

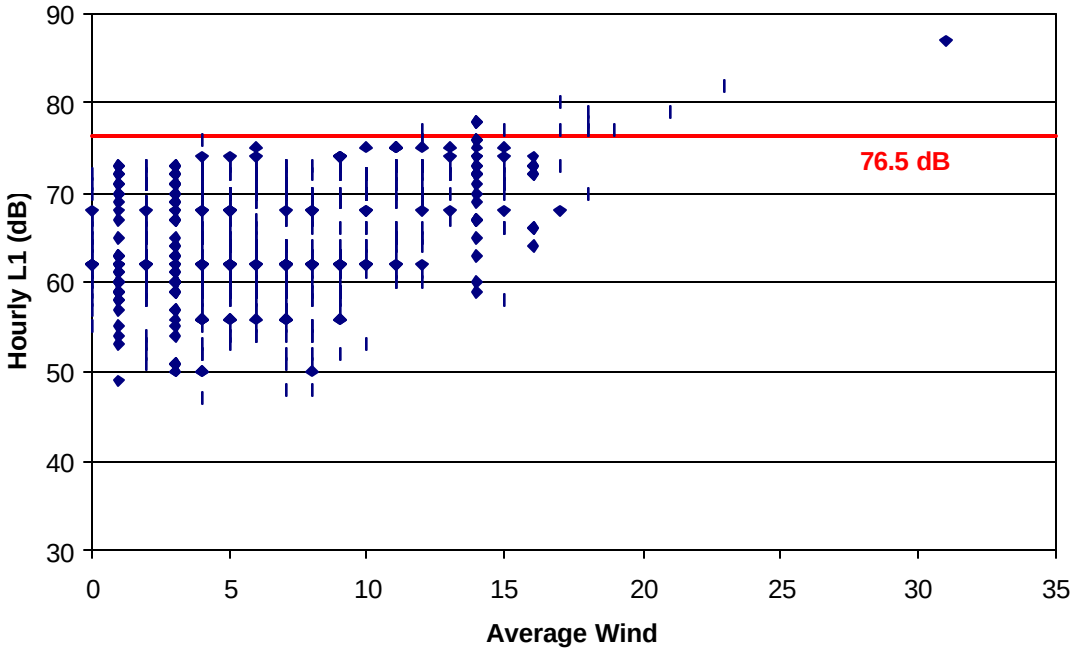

Figure 4. Hourly L1 versus hourly average wind speed

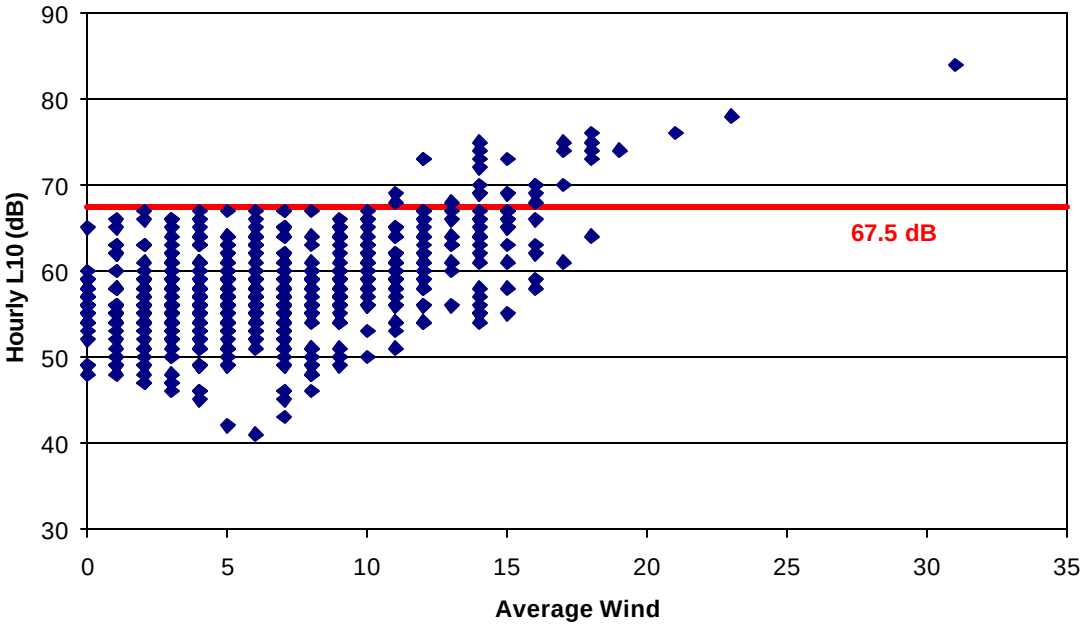

Figure 5. Hourly L10 versus hourly average wind speed

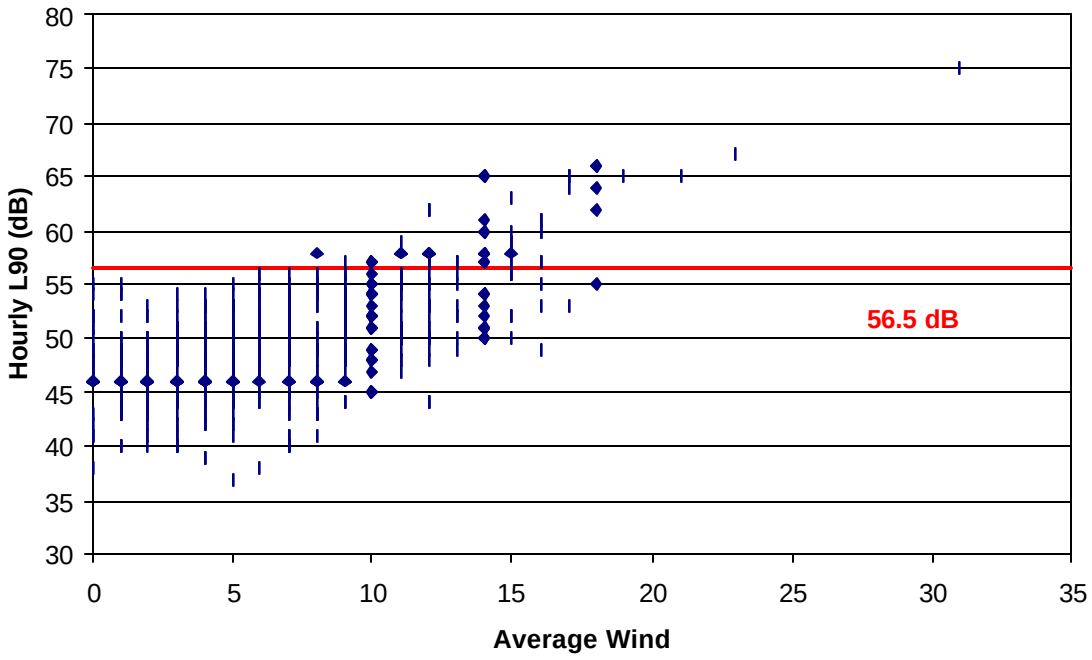

Figure 6. Hourly L90 versus hourly average wind speed

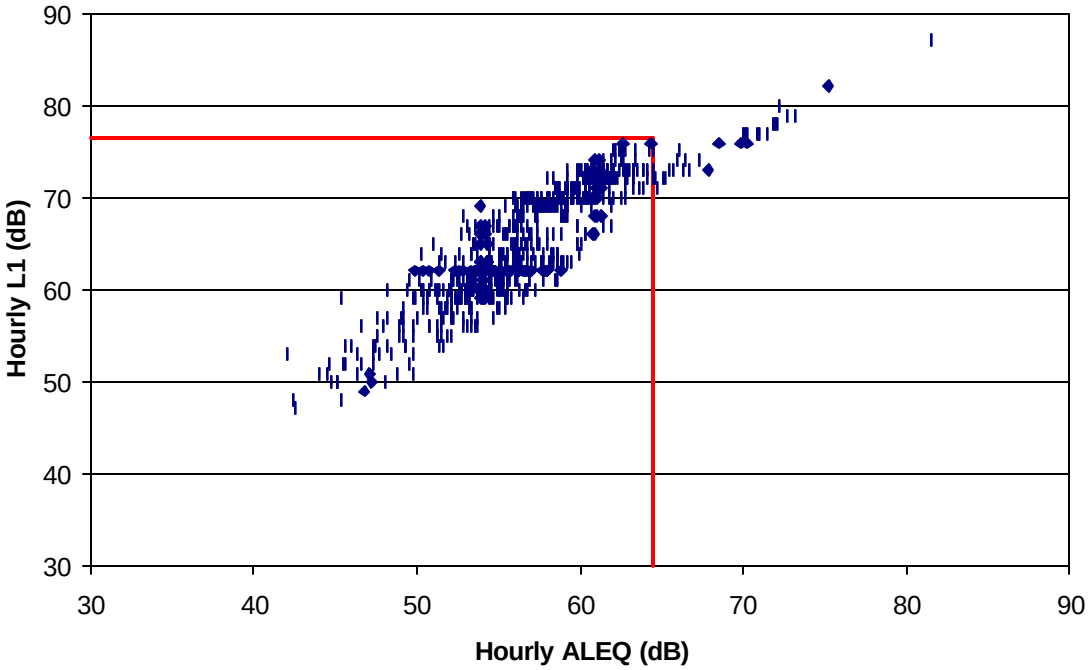

Figure 7. Hourly L1 versus Hourly ALEQ

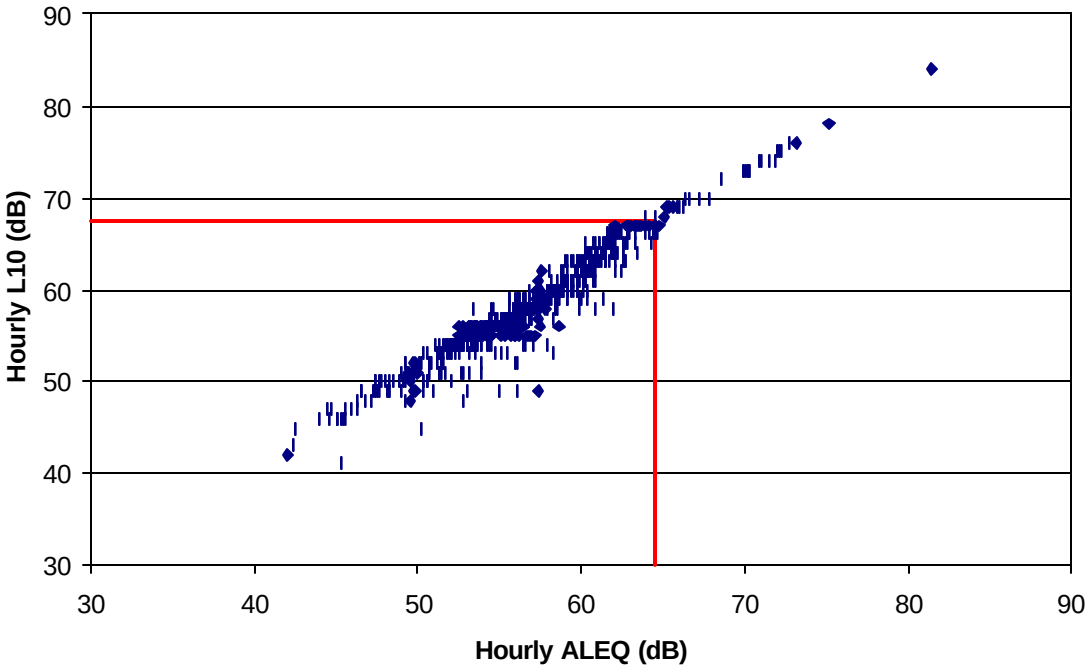

Figure 8. Hourly L10 versus Hourly ALEQ

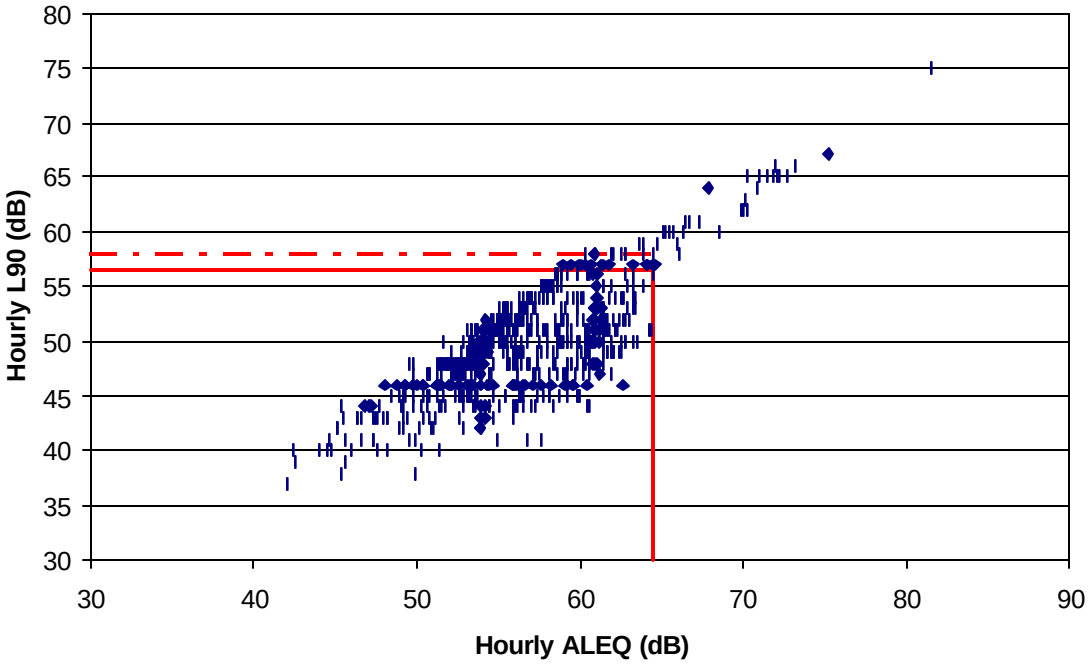

Figure 9. Hourly L90 versus hourly ALEQ

IV. DISCUSSION

In section II, the single-event noise data from February 5 were identified as very wind-corrupted data, the single-event noise data from February 17 were identified as wind-corrupted data, and the single-event noise data from December 27 were identified as a little wind-corrupted data. If one applies the 64-dB LEQ test to the hourly data for these three days, then all of windy hours on these three days are removed. This simple validation shows the reasonableness of this 64-dB ALEQ screen to determine and delete wind-corrupted data from the Hull monitor.

Table 3 compares the daily DNL calculated from the hourly data using:

(a) no screen

(b) Logan screen

Step 1. Elimination of any data such that the hourly L90 exceeds 55 dB

Step 2. Elimination of whole days when more than 1/4 of the “day” L90 exceed 55 dB

(c) elimination of any data such that the hourly LEQ exceeds 64 dB

This table also includes the energy average DNL for the entire ensemble of sample days. Results using the Logan screen (Steps 1 and 2) are shown in the third column of Table 3. Days eliminated by the "1/4 of the day" test are shown in red italics. The results show that February 5, the very windy day, is almost totally removed by all screening techniques.

If one uses only an hourly 55-dB L90 screen without deleting any whole days (Logan Step 1), then the ensemble result (Table 3) is 62.1 dB. Also, considering only the 55-dB L90 screen compared with the 64-dB LEQ screen (without deleting whole days), February 17 is dropped by about 10 to 12 dB by either screening technique but, as expected, the 64 dB ALEQ screen attenuates less than does the 55-dB L90 screen. December 27, the "slightly" windy day, is attenuated much less when using the 64-dB ALEQ screen than if one uses a 55-dB screen. This is as it should be. The December 27 data were only slightly windy and so the data for this day should be reduced only a little.

Historically, the 55-dB L90 screen (with deleting whole days—Logan Steps 1 and 2) has shown the airport only noise at Hull to be about 4 dB less than the total noise. This sample (Table 3) shows the 55-dB L90 screen value of 61.3 dB to be exactly 4 dB less than the total noise—exactly the historical value. In contrast, the 64-dB ALEQ screen is 2 dB less than the total noise. From the result using the 64-dB ALEQ screen, one can conclude that the aircraft only DNL at the Hull site is 2 dB less than the total measured DNL.

As yet one more test, if the hourly only 55-dB L90 screen (no deletion of whole days) is changed to 58-dB, the value one can infer from Figure 9, then 64-dB ALEQ screen and the 58-dB L90 screen yield virtually identical results of 63.2 dB.

Date	No Screen	55 dB L90 Screen	64 dB ALEQ Screen
6-Apr-00	65.0	65.0	65.0
18-Apr-00	63.7	*59.3*	63.7
30-Apr-00	61.6	61.6	61.6
12-May-00	64.1	64.1	64.1
24-May-00	59.0	59.0	59.0
5-Jun-00	60.1	59.9	60.1
17-Jun-00	63.8	63.5	63.5
29-Jun-00	61.8	61.8	61.8
11-Jul-00	0.0	0.0	0.0
23-Jul-00	60.7	60.7	60.7
4-Aug-00	59.2	59.2	59.2
16-Aug-00	63.6	63.6	63.6
28-Aug-00	60.0	60.0	60.0
10-Sep-00	59.0	59.0	59.0
22-Sep-00	65.6	65.6	65.5
4-Oct-00	64.4	64.4	64.4
16-Oct-00	62.6	61.8	62.6
28-Oct-00	0.0	0.0	0.0
9-Nov-00	61.8	61.8	61.8
21-Nov-00	65.7	*63.5*	65.5
3-Dec-00	63.4	*62.0*	63.4
15-Dec-00	67.2	*60.7*	66.3
27-Dec-00	69.9	*55.3*	67.1
12-Jan-01	61.2	61.2	61.2
24-Jan-01	62.3	62.3	62.3
5-Feb-01	73.0	*57.0*	59.7
17-Feb-01	71.3	*60.2*	62.1
1-Mar-01	62.0	62.0	62.0
13-Mar-01	62.8	62.8	62.8
25-Mar-01	64.9	64.2	64.9
Energy Average	**65.3**	**62.1(*61.3*)**	**63.2**

Table 3. Daily DNL (computed from hourly LEQ) and ensemble energy average DNL for the indicated wind screening technique. Days deleted using the L90 screen are shown in italics in red. The ensemble sum before deleting whole days is 62.1 dB for the 55-dB screen. With whole days deleted (red, italics), the ensemble sum drops to 61.3 dB.

V. CONCLUSIONS

Based on this sample, wind and/or wave noise seriously effects less than 10 percent of the sample days.

The present 55-dB L90 screen used by Logan seems to be a little too conservative. An L-90 level of 55 dB does not significantly affect the louder aircraft noise hours at the Hull monitor.

Hourly ALEQ of 64.5 dB or less regularly occurs at the Hull monitor in low wind conditions. Therefore, a screen using 64 dB ALEQ will not eliminate or alter non-windy data, but it will correct windy data.

Replacing each hourly ALEQ that exceeds 64 dB by 55 dB appear to correct for and remove the effects of wind and wave noise at the Hull monitor.

Using this 64-dB ALEQ screen, the aircraft only DNL is about 2 dB less than the total measured DNL at the Hull monitor.

REFERENCES

Schomer, Paul D., Matthew Bandy, Jeffrey Lamb, and Hans van Slooten, **(2000)**. "Using fuzzy logic to validate blast noise monitor data," *Noise Control Engineering Journal*, **48**(6), 193-205, Nov-Dec 2000.

ANNEX A. Example Daily Single Event Data Along With Winds and Runway Usage

Apr 6 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
0:00:00						270	14	24		
0:00:00	33L	33R	27	33L						
0:00:37									71.3	83.7
0:03:49									73.3	83.7
0:06:17									68.6	78.7
0:14:19									68.9	78.4
0:21:53									76.8	84.2
0:24:35									70.6	78
0:28:25									72.3	83.3
0:55:00	33L	33R	22R	22L						
0:57:40									70.8	81.4
1:00:00						270	19			
1:04:58									74.1	82.8
1:33:01									70.1	79.1
1:36:31									72.9	82.7
2:00:00						260	15	21		
2:13:01									77.3	85.4
2:52:05									71.3	80.1
3:00:00						250	15			
3:58:38									67.8	77.2
4:00:00						250	13	24		
4:08:40									73.1	81.6
4:15:17									76.6	86.8
5:00:00						240	13			
5:23:31									68.9	76.9
5:30:00	27	22L	22R	22L						
5:58:45									75.5	85
6:00:00						240	12			
6:06:57									74.7	85
6:13:05									74.7	84.5
6:16:34									72.7	82.7
6:26:16									70.9	79.1
6:37:51									74.7	85
6:39:15									75.5	85.9
6:41:30									78.2	86.9
6:51:36									74.8	85.4
6:52:35									71.1	79.1
6:53:19									74.1	83.4
6:54:31									70.8	80
6:56:32									73.1	83
6:57:43									72.7	82.2
7:00:00						230	12			
7:00:00						230	12			
7:09:12									69.3	78.4
7:22:09									76.8	88
7:27:21									77.6	84.6
7:33:26									74.9	85.6

Apr 6 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
7:39:42									75.4	84.4
7:42:04									69.1	77.1
7:42:19									73.2	83.4
7:46:11									76.2	86.2
7:51:30									70.9	82.3
7:52:58									75.1	85
7:56:27									72	79.6
7:57:19									72.9	83.8
8:00:00						230	12			
8:00:00						230	12			
8:00:00						230	12			
8:13:57									76.4	84.1
8:27:40									71.3	81.6
8:28:43									70.5	79
8:31:18									81	90.3
8:33:21									71.3	79.9
8:39:21									75	84.7
8:48:04									71.9	79.9
8:48:47									72.1	80.1
9:00:00						240	11			
9:00:00						240	11			
9:00:00						240	11			
9:11:34									73.3	81.2
9:15:37									75.6	85.5
9:16:56									75.7	87.7
9:20:00	22L	22R	22R	22L						
9:25:57									74.6	84.5
10:00:00						230	12			
10:00:00						230	12			
10:00:00						230	12			
10:30:00	27	22L	22R	22L						
10:48:14									73.3	83.5
10:48:59									69.6	77.1
10:53:22									74.5	85.6
11:00:00						230	10			
11:00:00						230	10			
11:00:00						230	10			
11:05:59									69.6	78.8
11:08:29									70.3	78.9
11:13:09									75	85.1
11:28:01									70	79.9
11:33:13									71	80.6
11:35:07									72.1	79.7
11:42:01									71.2	78.6
11:44:09									70.2	80
11:51:07									69.7	78.7

Apr 6 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
11:53:07									71.1	80.6
12:00:00						220	12			
12:00:00						220	12			
12:00:00						220	12			
12:04:25									71.4	80.9
12:25:16									72	82.7
12:31:19									69.5	77.8
12:47:58									74.5	82.7
13:00:00						200	4			
13:00:00						200	4			
13:00:00						200	4			
13:41:20									75.7	84.2
14:00:00						180	11			
14:00:00						180	11			
14:00:00						180	11			
14:06:30									80.4	89.4
14:28:32									73	79.5
14:44:53									71.6	79.9
14:49:51									71.8	81
15:00:00						180	13			
15:00:00						180	13			
15:00:00						180	13			
15:01:28									73.8	80.3
15:09:49									70.5	78.9
15:15:18									72.2	80.7
15:20:45									74.3	83.8
15:41:47									72.1	78.3
15:46:23									74.5	85.4
15:54:16									77	88.8
15:55:35									74.3	83
15:57:56									74	82
16:00:00						210	10			
16:00:00						210	10			
16:00:00						210	10			
16:04:30									73.2	82.4
16:05:11									72.1	79.3
16:07:17									73.8	81.9
16:14:51									79.7	89.5
16:19:15									73.6	82.8
16:21:11									73	82.3
16:23:47									71.8	78.6
16:26:12									76.4	85.2
16:29:29									73.8	82.6
16:51:02									71.1	80.3
16:54:16									74.7	85.8
16:57:53									72.3	82.7

Apr 6 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
17:00:00						230	3			
17:00:00						230	3			
17:00:00						230	3			
17:06:31									72.7	81.5
17:15:51									69.4	79.1
17:16:16									76	86.2
17:19:49									70.1	80.7
17:21:51									70.7	79.1
17:34:58									73.6	82.4
17:36:16									70.1	81.3
17:48:46									76.5	85.9
17:51:35									71.7	82.2
17:59:29									72.2	80.1
18:00:00						120	6			
18:00:00						120	6			
18:00:00						120	6			
18:01:20									69.4	77.9
18:10:09									77.7	89.1
18:14:09									74.6	85.4
18:14:57									71	82.8
18:18:53									75.4	84.6
18:19:55									76.4	86
18:21:37									72.3	83.5
18:25:00	4R	4L	9	4R	4L					
18:25:34									73.9	83.1
19:00:00						50	5			
19:00:00						50	5			
19:00:00						50	5			
19:52:21									68.1	77.2
20:00:00						20	10			
20:00:00						20	10			
21:00:00						340	11			
21:00:00						340	11			
22:00:00						300	3			
22:00:00						300	3			
22:00:00	27	22L	22R	22L						
22:14:19									73.2	82.8
22:23:52									70.2	79.4
22:28:19									71.9	82.5
22:30:43									74.7	84.3
22:32:24									73	83.5
22:38:28									79.5	90.1
22:43:04									69.3	77.7
22:47:42									71.9	81.5
23:00:00						200	6			
23:28:21									76.8	84.7
23:31:26									74.9	85.9

May 12 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
0:00:00						330	6			
0:00:00	4R	4L	15R							
0:35:00	33L		15R							
0:49:43									72.7	84.7
0:52:51									71.3	82
0:54:53									71.6	82.9
0:56:18									70.2	80.8
1:00:00						280	6			
1:00:23									70.5	81.1
1:13:29									70.2	81.1
1:20:19									70.2	80.3
1:26:15									79.7	90
1:45:39									69.6	80
1:55:33									70	77.9
2:00:00						280	7			
2:04:19									73.2	84.4
2:51:17									69.9	80.6
3:00:00						290	6			
4:00:00						290	8			
4:34:51									74	85
4:37:09									77.4	86.9
4:56:03									71.4	81.3
5:00:00						290	7			
5:42:08									74.2	83.3
5:44:02									74.1	84.5
5:45:00	27	22L	22R	22L						
5:48:33									71.7	81.4
5:51:28									73.8	83.8
6:00:00						280	6			
6:03:03									72.4	80.6
6:17:21									73.8	84.5
6:19:14									80.5	90.6
6:24:56									72.4	82.7
6:27:40									67.6	77.8
6:32:43									71.3	82
6:40:00									67.5	76.7
6:45:49									67.6	76.7
6:49:24									71.6	81.2
6:51:57									72.3	83.1
6:54:51									78.9	87.9
6:56:13									70.5	81.6
7:00:00						300	8			
7:13:49									71.4	82.9
7:16:30									70.4	81.4
7:22:20									79.9	90.8
7:26:46									70.5	79.3
7:30:46									70	79.9

May 12 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
7:37:08									71.8	83.8
7:41:35									76.5	87.5
7:42:50									68.2	81.4
7:43:40									71.9	82.4
7:47:00	33L	33R	27	33L						
7:49:30									74.1	84.2
7:51:00									68.4	77
7:53:38									68.6	77.3
7:55:05									73.2	84.2
7:56:10									68.2	78.7
7:59:59									67	76.5
8:00:00						300	6			
8:05:00									68.9	78.4
8:06:30									71.5	79.7
8:07:54									73.4	83
8:12:17									74.7	84.2
8:13:37									80	88
8:15:23									76.4	86.5
8:20:46									74.5	84.2
8:22:14									74.7	84.1
8:26:39									70.6	81.5
8:28:09									73.5	83.3
8:39:10									72.4	82.5
8:44:00									70.2	80.8
8:49:58									74.3	85.6
8:52:58									71.2	82
8:54:39									68.9	78
8:57:45									71.9	81.2
9:00:00						0	5			
9:04:34									71.6	81.8
9:08:49									73.4	83.5
9:10:31									74	84.4
9:15:51									76.3	86.8
9:17:38									68.3	77.9
9:19:12									71.5	82.2
9:20:43									73.3	84.9
9:22:34									71.2	82.5
9:27:52									71.3	81.6
9:31:24									76.7	87.1
9:35:00	4R	4L	4R	4L						
10:00:00						130	7			
10:00:00						130	7			
10:45:00	4R	4L	9	4R	4L					
15:55:35									70.4	81.1
16:10:00	27	22L	22R	22L						
16:31:18									68.4	77.3
16:36:14									75	83.7

May 12 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
16:46:18									73.9	84.2
16:47:07									68.6	77.3
16:58:18									73	84.7
17:09:36									68.6	78.9
17:16:45									81.9	91.2
17:41:58									77.1	87.5
17:42:47									74.2	85.1
18:09:47									73.2	83.9
18:18:56									81.7	91.8
18:23:55									74.9	85.3
18:24:29									69.9	80.2
18:34:51									76.7	86.1
18:38:14									72.2	82.3
18:39:35									72.4	80.9
18:40:40									75.5	85.7
18:43:27									76	86.1
19:00:29									70.9	83.1
19:02:05									74.4	85.5
19:15:58									71.1	81.2
19:20:40									70.2	80.2
19:21:44									70.9	82.1
19:32:23									74.9	84.2
19:35:42									69.8	80.6
19:40:39									67.5	76.7
19:41:39									74.8	86
19:47:58									75.5	85.6
20:06:58									69.7	81.7
20:13:52									67.7	77.9
20:25:49									74.6	85.3
20:28:52									69.5	79.8
20:31:36									68.4	78.9
20:34:30									70	80.1
20:42:00									75.1	86.2
20:51:37									70.1	81.4
20:53:55									75.6	86.7
20:57:36									71.7	81.1
20:58:21									71.6	82.9
21:02:09									70.5	79.5
21:03:08									71.3	81.7
21:06:59									78.2	87.6
21:16:05									70.2	80.2
21:22:46									73	83.1
21:27:55									73.4	84.3
22:19:28									81.6	93.3
22:39:32									76.3	87.1
22:57:08									68.1	78.2
23:00:00	22L	22R	15R	22L						

May 12 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
23:12:34									75.8	86.8

Jun 17 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
0:00:00						220	11			
0:00:00	27	22L	22R	22L						
0:03:52									69.1	78.2
0:07:46									70.7	79
0:19:48									77.3	88.1
0:41:26									75.7	85.3
1:00:00						220	9			
1:00:00	22L	22R	15R	22L						
2:00:00						230	10			
3:00:00						220	9			
4:00:00						220	10			
4:33:46									75	84.5
5:00:00						220	12			
5:50:00	27	22L	22R	22L						
6:00:00						230	12			
6:11:37									72.8	81.6
6:14:24									80.5	88.3
6:29:56									69	77.7
6:45:56									77.4	85.4
6:52:48									76.6	85.9
7:00:00						240	12			
7:09:40									80	88.3
7:19:13									77.9	87
7:22:22									76.3	86.1
7:28:05									71	77.6
7:41:26									75.9	84.5
7:55:04									78.2	86.5
8:00:00						240	12			
8:13:44									71.8	82.9
8:27:26									70.2	80.3
9:00:00						240	14	23		
9:08:22									73.7	81.6
9:09:36									69.9	77.6
9:18:47									74.1	84.2
9:28:35									73.5	83
9:40:16									75.9	85.6
9:45:06									72	82.4
9:46:22									70.8	79.6
9:50:16									69.1	79.1
10:00:00						240	10			
10:00:00						240	10			
10:35:45									71.2	81.1
10:50:59									80.9	89.9
10:54:42									79.2	88.3
10:57:25									78.3	87.2
10:59:06									69.1	80.7
11:00:00						230	10			

Jun 17 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
11:00:00						230	10			
11:00:00						230	10			
11:03:51									71.9	81.4
11:09:49									75.3	84.1
11:12:57									78.5	87.7
11:15:31									71	79.6
11:20:04									75.2	84.8
11:25:40									73.4	82.5
11:43:13									76.7	84.9
11:47:28									81.2	90.6
11:50:40									75	85.7
12:00:00						260	8			
12:00:00						260	8			
12:00:00						260	8			
12:13:51									71.2	81.4
12:39:05									75.5	82
12:48:43									67.9	79.4
12:54:28									79.4	88.7
13:00:00						240	12	21		
13:00:00						240	12	21		
13:00:00						240	12	21		
13:07:39									76.8	85.1
13:50:03									70.7	78.2
13:58:31									75	83
14:00:00						240	14			
14:00:00						240	14			
14:00:00						240	14			
14:11:24									69.2	78.6
14:29:08									73.9	81.9
14:30:49									73.1	83.8
14:40:41									76.1	83.7
14:41:50									71.2	78.9
14:47:57									70.9	79.9
15:00:00						240	22	30		
15:00:00						240	22	30		
15:00:00						240	22	30		
15:16:12									71.5	79.9
15:24:52									76.5	85.5
15:42:47									76.4	85.5
15:47:50									67.9	78.7
15:50:00	33L	33R	27	33L						
15:55:03									71.8	81.2
15:56:27									76.3	85
15:57:51									77.6	87.5
16:00:00						310	19	31		
16:00:27									76.1	86.9
16:00:30									73.9	82.6

Jun 17 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
16:02:00									69.9	79.2
16:02:59									77.3	84
16:03:19									73.1	81.6
16:03:55									72.1	84.8
16:05:48									75.6	86.4
16:07:48									72.8	84.2
16:09:33									71.9	83.5
16:11:40									72	84.1
16:14:35									76.1	85.2
16:21:37									73.3	84.3
16:23:59									72.7	83.6
16:27:56									76.5	84.6
16:29:36									72	83.2
16:31:20									67.5	76.6
16:34:28									73.2	82
16:37:39									71.2	81.6
16:39:47									78.8	89.2
16:42:08									68	76.9
16:43:36									70.4	79
16:46:58									72	82.9
16:49:13									77.9	88.2
16:50:39									84.4	93.9
16:51:59									75.6	86.7
16:55:56									75.4	83.6
16:58:00									74.8	86
17:00:00						280	17	28		
17:00:00						280	17	28		
17:05:41									75.8	87.5
17:20:04									72.6	83.5
17:23:59									74.1	85.2
17:26:42									75.7	85.8
17:28:58									72.6	84
17:30:47									70.4	80.1
17:34:35									71.1	79.8
17:36:12									75.9	86.8
17:40:08									72.9	83.3
17:41:57									73.4	84
17:43:13									71.1	81.9
17:44:44									72.9	83.6
17:47:01									71	81.3
17:48:45									77.9	88.1
17:51:02									71.7	83.2
17:54:03									73	83.9
17:56:15									73.1	82
17:57:54									70.9	81.7
18:00:00						270	8			
18:00:00						270	8			

Jun 17 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
18:00:00						270	8			
18:00:58									72.8	83.9
18:03:51									74	85.2
18:05:23									69.4	78.7
18:06:39									76.7	85.5
18:09:33									71.5	81.6
18:11:20									73.9	84
18:13:42									72.9	82.5
18:14:51									74.6	82.9
18:17:15									75.3	85.6
18:19:26									70.7	81.3
18:20:57									68.1	77.2
18:22:19									74.1	82.1
18:23:50									70.7	81.9
18:25:30									71.1	80.9
18:27:03									67.2	76.5
18:29:22									72.6	82.9
18:31:29									81.2	91.4
18:34:34									71.8	81.7
18:35:51									71	81.5
18:38:18									73.3	82.7
18:39:59									71.7	82.2
18:41:53									74	83.3
18:44:56									73.1	83.2
18:46:09									71.1	81.2
18:48:53									72.2	81.7
18:54:36									67.3	76.9
19:00:00						250	9			
19:00:00						250	9			
19:00:00						250	9			
19:00:26									81.6	89.5
19:02:55									69	80.7
19:04:36									72.1	82.1
19:06:00									72	82
19:08:03									70.8	80.5
19:09:52									72.8	81.6
19:14:31									72.9	83
19:18:08									71.3	80.1
19:19:49									69.9	80.4
19:21:14									69.6	77.5
19:23:55									67.4	76.7
19:25:38									75	85.2
19:28:00									71.6	82.7
19:32:46									76.9	87.1
19:33:58									74.9	82.9
19:35:07									73.6	83.5
19:36:27									73.7	83.2

Jun 17 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
19:37:45									70.3	80.8
19:40:38									73.9	83.2
19:43:02									70.6	81.1
19:45:50									72	81.7
19:47:14									73.2	82.9
19:50:11									67.9	77.3
19:52:53									72.9	80.7
19:54:50									71.1	81.6
19:57:24									73.3	81.9
19:58:50									73.6	82.2
20:00:00						260	9			
20:00:00						260	9			
20:00:00						260	9			
20:02:14									72.4	81.9
20:04:15									71.7	81.3
20:06:53									70.8	80.4
20:08:22									72.7	82.7
20:17:00									76.2	85.8
20:29:51									72.8	84
20:33:13									76.1	86.3
20:36:26									74.3	84.4
20:37:52									70.2	79.9
20:39:16									73.6	83.7
20:41:24									73.5	82.8
20:43:19									73.4	83.5
20:45:09									74.1	83.6
20:48:39									72	82
20:50:00									69.5	77.9
20:55:57									70.7	80.7
20:57:14									68.6	78.6
20:59:52									78.1	88
21:00:00						270	10			
21:00:00						270	10			
21:00:00						270	10			
21:01:19									70.7	80.5
21:03:29									67.6	77.6
21:05:13									72.7	83.3
21:07:58									72.2	81.2
21:09:17									70.7	81.1
21:10:45									72	84
21:15:00									77.7	87.1
21:16:26									72	82.5
21:18:20									70	79.6
21:19:53									72.9	81
21:24:26									71.7	82.2
21:26:41									70.6	79.7
21:28:38									75.7	85.1

Jun 17 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
21:30:36									73.7	82.5
21:32:26									72.8	83
21:34:24									71.2	81.1
21:36:16									73.3	84.4
21:37:37									68.2	77.8
21:38:55									73.2	83
21:46:36									69.4	78.5
21:54:59									73.9	83.1
21:57:22									73.6	82.2
22:00:00						280	9			
22:00:00						280	9			
22:02:02									72.2	82.2
22:04:27									71.5	81.4
22:11:44									70.6	81
22:16:55									75.7	84.9
22:31:28									70.1	80.8
22:33:07									73.3	83.5
22:34:41									74.2	84.1
22:39:20									73.2	82.5
22:40:49									69	77.6
22:42:13									70.3	80.5
22:43:42									69.5	81
22:45:15									70.3	79.9
22:46:48									73.2	84
23:00:00						280	9			
23:00:00						280	9			
23:04:00									68.2	79
23:10:27									70.5	80.5
23:14:46									70.3	80.1
23:17:06									72.2	82.4
23:20:54									69.7	80
23:22:25									74.1	83.7
23:25:04									72.4	82.7
23:35:36									71.8	81.9
23:37:33									71.5	80.4
23:48:02									69.6	79.4
23:57:01									74.3	84.7

Dec 15 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
0:00:00						300	9			
0:00:00						300	9			
0:00:00	33L	33R	27	33L						
0:18:49									79.8	90.9
0:22:18									71.6	81.9
0:24:47									73.4	83.5
0:26:55									67.8	80.5
0:29:18									70.1	77.7
0:31:50									73.2	85.6
0:35:16									72.6	82.9
0:40:14									72.4	83.7
0:43:02									73.7	83.1
0:44:11									75.1	85.1
0:46:59									73.1	83
0:55:08									73.1	83.4
0:56:59									75.3	83.1
0:58:46									70.5	83.2
1:00:00						310	11	26		
1:01:42									72.9	84.8
1:08:06									72.2	83.1
1:11:27									68.1	77.8
1:15:58									72.4	81.1
1:23:33									71.5	83.9
1:32:58									69.9	78.1
1:33:22									72.6	80.3
1:34:40									72.7	83.5
1:35:12									71.4	82.2
1:36:09									69	78.3
1:38:05									72.2	84.6
1:39:53									72.5	84.3
1:55:05									69.9	77.2
1:56:33									69.8	79
2:00:00						300	12	22		
2:01:44									70.8	80.7
2:04:52									70.4	78.6
2:09:42									73	80.7
2:17:26									69.2	77.9
2:21:08									72.6	84.5
2:23:53									72.1	83.3
2:32:29									71.1	80.2
2:38:10									70.7	78.7
2:43:10									73.1	81
2:43:45									72.9	80.4
2:46:36									73.7	79.6
2:48:13									78.7	91.1
2:51:16									72.4	79.1
2:55:17									74.9	84.4

Dec 15 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
2:56:15									70.9	79
2:56:45									72.7	81.3
3:00:00						310	13	29		
3:02:19									74.7	79.7
3:05:38									71.3	79.6
3:05:49									71.6	80.9
3:11:08									72.7	80.4
3:13:17									70.7	79.6
3:24:41									72.7	83.9
3:28:24									69.3	80.1
3:31:57									70	79.9
4:00:00						320	16	26		
4:19:58									75	85.6
4:52:27									74.2	84.4
4:56:49									74.7	85.1
5:00:00						320	13	24		
5:27:50									77.9	87.1
5:35:00									71	81.3
5:48:24									70.4	81.9
5:51:59									71.3	81.9
6:00:00						330	13			
6:06:59									70.1	80.5
6:09:49									75.2	86.3
6:12:12									72.1	84.2
6:20:33									75.9	86.3
6:24:11									69.2	79
6:30:00	4R	4L	4R	4L						
7:00:00						320	12			
8:00:00						310	14			
9:00:00						320	11			
10:00:00						330	10	20		
11:00:00						320	7			
11:33:16									71.6	82.7
11:58:00	4R	4L	9	4R	4L					
12:00:00						0	6			
13:00:00						0	5			
13:31:07									71.8	79.7
13:31:52									71.9	81.8
13:33:23									75.3	83.2
13:36:57									73.6	84
14:00:00						70	6			
15:00:00						120	6			
15:00:00						120	6			
16:00:00						0	0			
16:00:00						0	0			
17:00:00						170	6			
17:00:00						170	6			

Dec 15 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
18:00:00						160	5			
19:00:00						0	0			
19:50:00	27	22L	22R	22L						
20:00:00						200	6			
20:00:00						200	6			
20:00:00						200	6			
20:05:06									75.3	84.4
20:07:10									75.5	88
20:11:32									70	78.1
21:00:00						220	5			
22:00:00						210	3			
22:45:52									75.8	86.5
22:55:09									75.8	86.6
23:00:00						210	4			
23:19:58									71.4	82
23:35:29									70.4	79

Feb 5 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
0:00:00						190	5			
0:00:00	33L		15R							
0:02:07									71.3	81.4
0:04:08									71.5	80.7
0:07:30									72.9	82.5
0:10:08									69.4	78.1
0:12:50									70.1	80.3
0:16:02									71.5	81.6
0:18:42									71.6	81.4
0:26:01									70.8	81
0:28:34									72.4	82
0:44:31									70.2	79.8
0:52:25									71.8	83
1:00:00						170	5			
1:19:07									71.9	81
2:00:00						160	4			
3:00:00						140	4			
3:00:00						140	4			
4:00:00						150	3			
5:00:00						140	3			
5:00:00						140	3			
5:30:53									69.6	80.4
5:50:00	4R	4L	9	4R	4L					
6:00:00						120	4			
6:00:00						120	4			
6:19:51									68.1	78.4
7:00:00						130	5			
7:03:11									77.8	83.2
7:14:55									69.4	81.9
8:00:00						100	8			
8:43:20									69.4	78.7
8:51:54									69.6	79
9:00:00						120	9			
10:00:00						100	7			
10:00:00						100	7			
11:00:00						90	13			
11:00:00						90	13			
11:00:00						90	13			
11:30:00	4R	15R VA 4L	9	4R	4L					
11:39:34									70.8	87.2
12:00:00						80	14			
12:00:00						80	14			
12:00:00						80	14			
13:00:00						80	14			
13:00:00						80	14			
13:22:22									70.8	78.3
13:45:00	4R	4L	9	4R	4L					

Feb 5 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
14:00:00						70	16			
14:00:00						70	16			
14:00:00						70	16			
14:23:57									72.6	83
15:00:00						70	19	28		
15:00:00						70	19	28		
15:41:06									73.6	83.6
16:00:00						60	18			
16:31:36									69.8	80.2
16:55:26									69.1	77.9
17:00:00						50	19	28		
17:01:00	4R		4R							
17:14:14									69.6	78
17:16:30									69.3	78.1
17:17:04									76	87.9
17:19:00	4R		9	4R						
17:20:14									70.6	78.4
17:26:17									73.4	80.4
17:30:53									73	80.3
17:36:24									72.3	78.4
17:37:14									74.9	80.8
17:38:15									74	87.2
17:40:33									75.3	81.2
17:41:17									74	81.6
17:41:26									75.1	81.5
17:42:32									77	87.8
17:43:19									73	81.4
17:43:56									73.1	81
17:44:18									72.6	79.2
17:45:27									75.2	84.8
17:46:27									74.3	80.4
17:46:38									71.6	78.6
17:46:51									73.9	83.6
17:47:37									77.4	86.9
17:48:01									77.9	88.9
17:48:52									71.3	79
17:49:05									75	81
17:49:41									75.9	88.7
17:50:23									73.1	80.4
17:51:16									70.8	78.7
17:51:59									74.1	80.5
17:52:30									73.4	80.2
17:53:02									75.8	87
17:53:59									76.8	89.1
17:55:37									77.3	89.8
17:55:57									74.3	84
17:56:39									76.9	90.8

Feb 5 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
17:58:14									70.8	78.2
17:58:26									74.9	81.9
17:58:38									69.4	78.2
17:59:05									71.6	80
17:59:13									72.7	80.1
17:59:25									74.8	82.4
18:00:00						20	22			
18:00:01									72.9	80.1
18:00:43									77.6	91.6
18:01:00	4R		4R							
18:01:59									76.6	84.9
18:02:39									74.3	85
18:02:54									73.4	79.6
18:03:20									77.4	92.7
18:05:32									75.4	84.4
18:06:00									79.6	89
18:06:58									73.6	85.3
18:07:42									79.2	90.7
18:08:54									74	81.1
18:09:10									77.9	84.8
18:09:31									68.2	76.6
18:09:48									77.9	91.9
18:14:50									81.6	97.4
18:16:10									74.5	82.6
18:16:51									72.9	81.2
18:17:09									73.2	83.6
18:17:37									70.6	78.6
18:17:55									77.5	91.6
18:22:24									79.4	96.6
18:24:39									73.4	83.4
18:25:19									72.3	81.6
18:25:47									77.2	84.2
18:26:36									78.9	91.8
18:27:28									73.2	85.5
18:28:16									73.4	80.9
18:28:55									78	91.6
18:30:22									76.7	83.6
18:30:35									77.7	87.9
18:31:22									76.9	83.5
18:31:34									76.3	88.8
18:34:12									79.5	93.2
18:36:08									79.7	93.7
18:37:20									76.4	87.7
18:40:25									78.5	96.6
18:43:02									73.3	80.8
18:43:32									77	88.2
18:44:15									73.3	82.7

Feb 5 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
18:44:50									71.8	79.2
18:45:07									77.5	89.8
18:46:33									76.4	86.3
18:47:32									70.4	79.1
18:47:45									71.8	79.5
18:48:54									73.9	82.5
18:49:24									68.7	78.2
18:50:18									76	89.5
18:51:15									72.2	82.7
18:51:43									74.2	84.9
18:52:32									75.5	87.7
18:53:10									70.8	80.6
18:53:56									72.6	82.4
18:54:19									71	81.4
18:54:43									75.8	87
18:55:28									71.7	78.7
18:56:33									72.5	79.6
18:56:50									75	87.4
18:57:34									76	83.9
18:57:56									74.9	83.5
18:58:28									70.4	78.8
18:59:28									73	81.3
18:59:51									75.9	86.9
19:00:00						30	24	32		
19:00:00						30	24	32		
19:02:17									78.9	93.5
19:03:10									70.4	79.7
19:04:00									77.6	87.9
19:04:39									75	82.5
19:05:16									70	77.4
19:05:33									72.4	82
19:06:03									73.4	81.6
19:06:13									68.4	78.2
19:06:41									72.2	85.2
19:07:21									69.8	78
19:08:29									73.7	80.7
19:09:46									70.7	77.8
19:11:53									68.8	77.9
19:15:40									70.6	78.8
19:16:10									70.7	80.2
19:16:37									73.3	82
19:16:52									71.3	82.3
19:17:18									68.4	76.8
19:17:53									71.3	80.2
19:18:16									70.9	81.9
19:18:51									71	81.1
19:18:58									69.3	79.7

Feb 5 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
19:19:55									70.9	81.7
19:21:17									69.8	78.1
19:21:31									70.1	78.3
19:22:58									70	78.6
19:23:42									67.9	77.6
19:24:18									70.2	78.3
19:25:05									70.3	81.6
19:26:22									73.1	84.2
19:27:59									68.6	80.4
19:29:27									71.6	78.8
19:30:02									72	84
19:30:26									68.9	77.6
19:30:55									70	80.9
19:31:32									73.1	80.4
19:31:58									71.8	82.9
19:32:23									70.6	82.5
19:33:15									71.7	84.3
19:33:44									72.7	82.9
19:34:14									69.9	80.2
19:35:05									70.1	78.5
19:35:46									70.6	84.3
19:36:12									73.8	84.3
19:37:00									73.4	79.2
19:37:23									70.7	83.1
19:37:51									68.3	78.5
19:38:44									68.8	81.2
19:40:30									68.8	78.6
19:40:54									70	81.9
19:41:20									71.1	81.2
19:41:37									72.8	82.7
19:42:18									73.2	87.4
19:43:30									70.2	79.4
19:43:54									71.2	82.1
19:44:38									70.9	81.3
19:45:15									71.5	79.1
19:45:43									72.3	82.2
19:46:05									71.4	86.7
19:48:07									70	80.2
19:48:49									72.5	83.2
19:49:13									73.3	81.1
19:49:37									72.9	84.6
19:50:19									71.3	84.2
19:51:58									72.6	86.4
19:52:30									70.1	82.4
19:52:48									70.1	78.8
19:53:22									75.2	87.1
19:54:24									74.7	85.5

Feb 5 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
19:54:43									68.7	77.6
19:55:05									71.7	83.4
19:56:01									73.6	87.2
19:56:44									72.9	85.3
19:58:11									73.7	89.6
19:59:16									73.9	89.3
20:00:00						20	24	33		
20:00:00						20	24	33		
20:00:30									74.3	88.3
20:02:24									73.8	85.7
20:03:57									76.6	93.4
20:05:40									72.8	82.4
20:06:11									71.8	82.4
20:06:33									71.9	81
20:06:42									71.8	78.7
20:13:13									80.3	98.8
20:15:25									74	84.3
20:15:53									70.9	81.5
20:36:20									84.3	104.2
21:00:00						10	28	39		
21:00:00						10	28	39		
21:00:19									86.4	109
21:06:07									90.4	116.9
22:00:00						0	26	37		
22:00:00						0	26	37		
22:00:32									87.2	105
22:13:45									78.2	95.2
22:18:01									78.4	98.1
22:24:36									75.3	86.5
22:25:15									72.3	83.7
22:25:42									73.8	83.9
22:26:21									75.2	85.7
22:27:56									79	92.8
22:29:42									73.6	83.7
22:30:00									75.3	84.5
22:31:09									76.3	90
22:32:16									72.2	81.8
22:33:26									76.6	88.7
22:34:19									73.7	86.6
22:35:04									75.7	87.4
22:35:55									71.7	82.1
22:36:28									69.4	79.3
22:36:44									72.1	83.3
22:37:17									72.4	80.9
22:39:01									75.3	90.9
22:39:32									74.8	85.3
22:40:20									73.1	84.4

Feb 5 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
22:40:49									74.4	82.9
22:41:24									75.9	91.3
22:43:12									71.9	82.3
22:43:48									70.1	80.7
22:44:04									72.4	81.9
22:44:24									70.3	78.4
22:46:02									73	83.3
22:46:31									71.8	79.9
22:47:13									75.2	88.2
22:48:02									68.4	78.3
22:48:26									75.2	87.4
22:49:51									74.8	87.8
22:50:43									71	79.5
22:51:03									71.8	80
22:51:30									71.4	86.5
22:52:20									73.7	83.8
22:53:35									76.4	89.8
22:54:15									69.7	78.9
22:55:44									73.4	85.3
22:56:46									71	78.8
22:57:15									71.2	82.3
22:57:55									72.9	80.3
22:58:31									73.9	84.1
22:59:09									73.1	84.4
22:59:32									74.8	82.9
22:59:57									72.8	82.4
23:00:00						320	20	31		
23:00:00						320	20	31		
23:00:14									71.9	81
23:00:49									73.3	84.2
23:01:11									71.4	78
23:01:46									73.8	82.7
23:02:18									68.8	77.6
23:02:54									75.6	86.8
23:03:31									75.9	86.6
23:04:08									73.7	81.4
23:04:42									74.8	86.4
23:05:15									74	85.5
23:05:44									75.8	83.7
23:06:00									70.9	77.9
23:07:10									71.7	84.4
23:07:26									79.3	85
23:08:21									75.8	89.9
23:09:41									70	79.8
23:10:32									72.6	84.1
23:11:25									72.3	80.1
23:11:51									74.9	83.7

Feb 5 Time	Landing Primary	Landing Secondary	Takeoff Primary	Takeoff Secondary	Takeoff Tertiary	Wind Direction	Speed (Knots)	Gusts (Knots)	Lmax (dB)	ASEL (dB)
23:12:15									71.9	79.3
23:12:45									69.5	77.6
23:13:32									69.3	79.6
23:13:46									71.5	82.8
23:14:27									72.3	85
23:15:39									68.6	77.1
23:16:23									70.7	78.8
23:17:05									73.3	85.5
23:18:15									75	89.2
23:19:14									71.4	80.9
23:19:43									70.4	82
23:20:23									74.6	87.4
23:21:16									75.9	88.2
23:22:26									71.4	81
23:23:50									71.4	82.8
23:24:07									70.6	80.6
23:25:11									77.1	89.7
23:26:14									77.1	90.9
23:28:44									78	92.3
23:30:29									77.3	90.5
23:32:07									76.8	92
23:34:23									71.7	79.3
23:34:37									69.3	79.4
23:35:21									75.1	86.9
23:35:50									69.3	78.5
23:36:08									68.3	77
23:36:16									70.4	78.9
23:36:36									77.5	85.1
23:36:56									73.1	80.8
23:37:46									73.9	88
23:38:48									75.5	89.6
23:40:50									78.9	97.8
23:47:05									73.5	81.9
23:49:39									78.8	97
23:53:45									77.6	97.7