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GROUND WINDS FOR KENNEDY SPACE CENTER, FLORIDA (1978 VERSION)

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FOREWORD

This revised document was required because 6.5 additional years of peak wind information was available for incorporation into the existing 12.5-year Kennedy Space Center peak wind data sample. Also, newer programs were written which calculated headwind and tailwind statistics separately. This document supersedes NASA CR-128995 and should be used in place of it.

GROUND WINDS FOR KENNEDY SPACE CENTER, FLORIDA (1978 VERSION)

I. INTRODUCTION

This report deals with surface-level wind conditions for NASA's Kennedy Space Center (KSC), Florida, including the Cape Canaveral, Florida, area. Since KSC will be the primary landing site after the first four Orbital Flight Tests of the Space Shuttle, these statistics may prove useful in mission planning activities. This report presents low-level crosswind, headwind, tailwind, and headwind reversal statistics by hour and month for use with the main KSC Shuttle runway orientation.

The winds were recorded at the Cape Canaveral Air Force Station (CCAFS). In March 1978 the wind observation site was moved to the Shuttle runway. Even though the Shuttle runway (approximately 11.5 miles northwest of the CCAFS wind observation site) may exhibit some differences in the wind regime — perhaps more thunderstorms or different sea-breeze effects — the wind statistics presented provide the best available mission planning information to date. This document supersedes NASA CR-128995 and should be used in place of it.

II. ARRANGEMENT OF TABLES

Tables are numbered and arranged by monthly reference period, with subnumbers used to identify the crosswind, tailwind, headwind, or reversal statistics within each month as follows:

Section III

Crosswind: Tables 1.1 through 13.1

Tailwind: Tables 1.2 through 13.2

Crosswind versus Tailwind: Tables 1.3 through 13.3

Headwind Reversals: Tables 1.4 through 13.4

Headwind: Tables 1.5 through 13.5.

III. RUNWAY CROSSWINDS, TAILWINDS, AND HEADWIND REVERSALS

A. Background

A study similar to the one presented here was previously done for the NASA/KSC, Florida area in October 1972 [1]. That study used hourly peak ground wind data to determine optimum runway orientation by minimizing critical high crosswind component frequencies. The proposed runway orientation was then used in conjunction with the hourly peak wind data to determine frequencies of headwind-to-tailwind reversals that resulted in specified tailwind speeds. The present KSC wind study expands on the two types of information determined previously for KSC and adds a section on tailwinds and headwinds alone. This type of runway wind study was also completed for the Edwards AFB area [2].

B. Runway Orientation

The runway of interest for NASA Shuttle Orbiter landings at KSC is Space Shuttle runway 15-33 (150-330 degrees). Figure 1 is an artist's conception of the Space Shuttle Orbiter making its final approach (toward the north) onto the KSC runway end 33 after completing a space mission. Figure 2 indicates the general layout of the Shuttle runway. The runway is designated 15-33 because of its angle of separation in degrees clockwise from magnetic north and indicates a pilots approach toward that direction. That is, a pilot desiring to land toward the south on 15-33 would enter from the north end (15), thereby allowing him to land toward 150 degrees. The runway orientation with respect to true north is within 0.5 degree of magnetic north. All magnetic runway wind statistics given in this report were computed with respect to true north.

The Shuttle runway is oriented so that a vehicle landing from the northwest toward the southeast will probably be landing into a headwind during the summer months. Figure 3 [3] gives the prevailing surface wind direction versus hour and month. The respective percentages of the prevailing direction are given within each box. These prevailing KSC wind directions were developed by using

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Figure 1. Space Shuttle Orbiter landing on runway 33 at KSC, Florida.

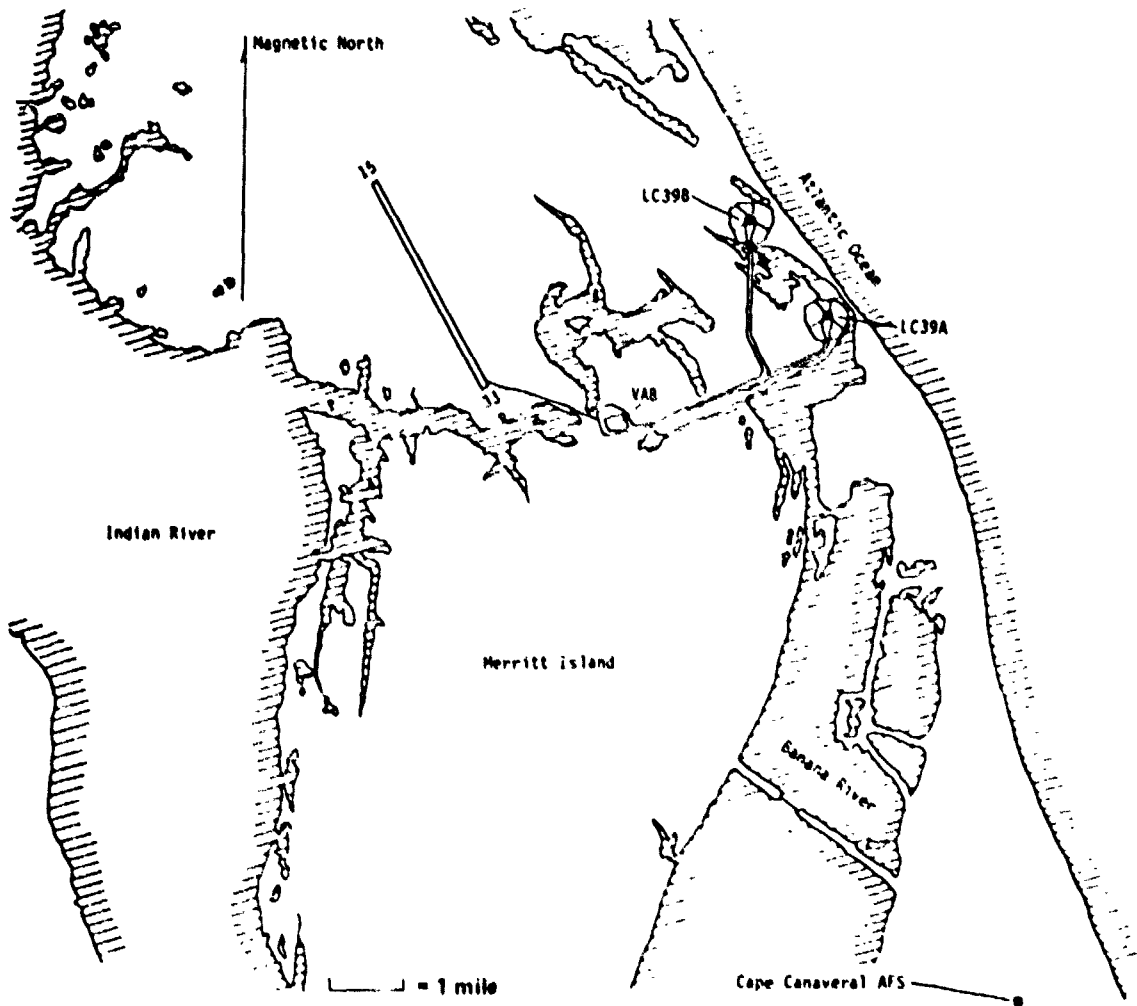


Figure 2. KSC Space Shuttle runway 15-33.

hourly mean values. Generally, a 1-minute average is taken about each hour. From Figure 3 one can see that runway 15 headwinds (winds from east through south) prevail from April through September for most all hours of the day. Headwinds for runway 33 (winds from the northwest and north) prevail in the winter for most all hours from November through February, with March and October classified as transition months. Mean hourly surface wind speeds (in knots) versus hour and month are given in Figure 4 [3]. It can be seen that wind magnitudes generally pick up during the afternoon hours [1200-1700 local standard time (LST)], with larger magnitudes generally observed during the fall, winter, and spring months.

KSC AUG 50 - DEC 70 P.O.R.
3 hour INTERVALS (LST)

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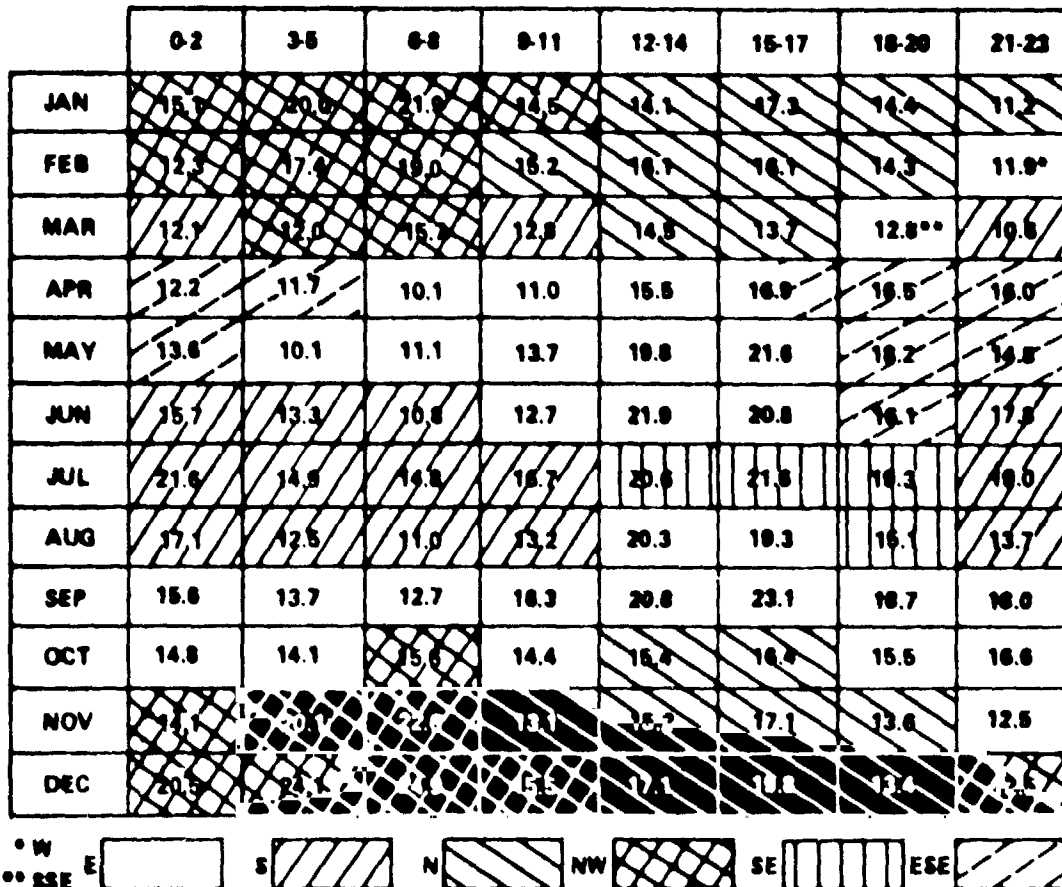


Figure 3. KSC percentage of prevailing wind direction.

C. Data Used

The ground wind speed and direction data used in this study were taken from a magnetic tape containing the CCAFS hourly surface peak wind observations (similar to Reference 4). The period of record extended from September 1958 through December 1977. The tape gave a total of 159,938 hourly peak wind observations for KSC, Florida. All calms were included in the data sample. The hourly peak wind sample used here is the peak wind speed (and associated direction) observed between 30 minutes prior to and 30 minutes after the hour. Speeds were read to the nearest whole knot, directions to the nearest degree. During the period of record the anemometer location was changed several times. However, most of the observations were made approximately 10 meters (33 feet)

KSC P.O.R. AUG 50 - DEC 70

3 hour INTERVALS (LST)

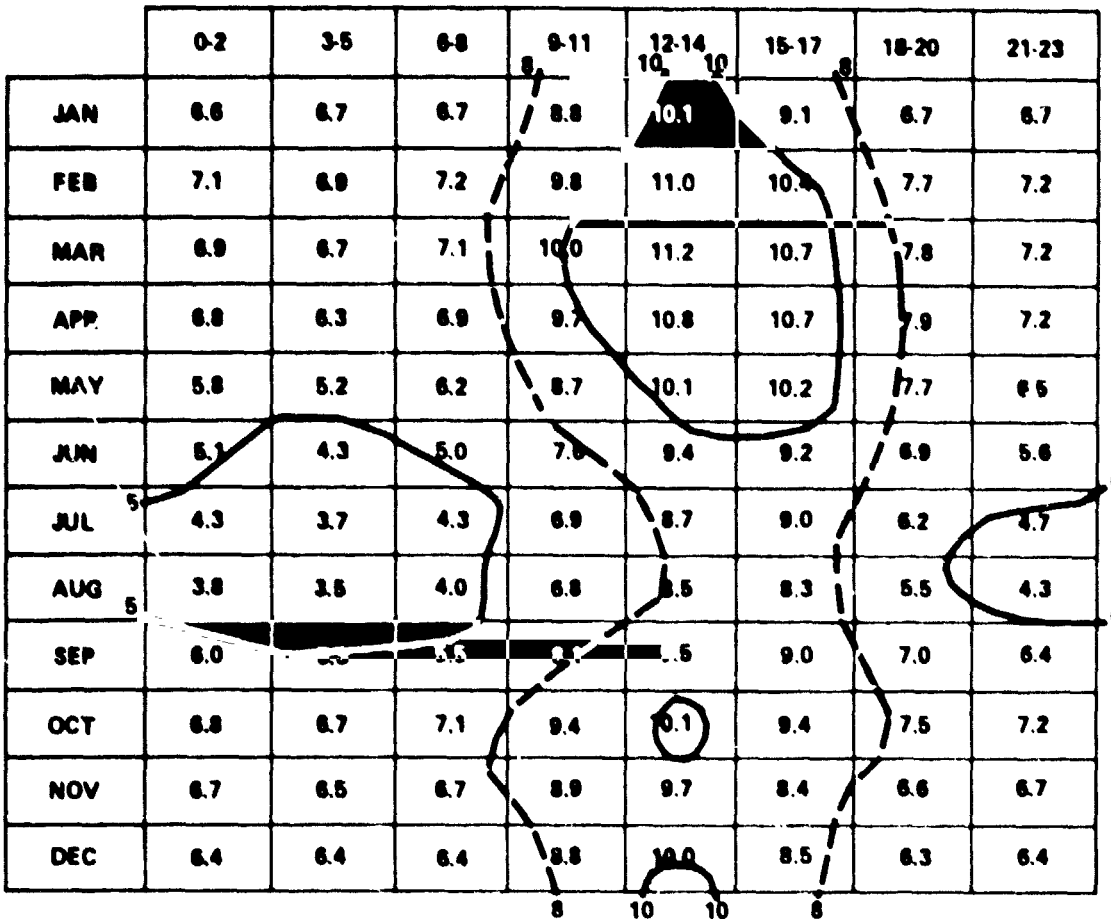


Figure 4. KSC mean surface wind speed (knots).

above natural grade. In Space Shuttle vehicle ground wind related analyses, peak wind speeds (or gusts) are generally more useful in design, mission planning, and operational activities.

D. Computational Methods/Equations

1. Crosswind Procedure. This section includes a discussion of the computational methods used in obtaining the percentage frequency of occurrence within critical crosswind intervals, i.e., 1 to 4, 5 to 9, 10 to 14, 15 to 19, 20 to 24, and 25-up knots. The crosswind equation used for the runway is:

$$\text{Crosswind} = (\sin | \text{WD} - \text{RA} | \times \text{WS}) \quad (1)$$

where

RA = runway angle measured from true north

WD = wind direction in degrees clockwise from true north

WS = wind speed in knots.

The runway crosswind component for each observation was computed and then checked against the several critical crosswind intervals, and a tally was entered into the appropriate matrix position. Every wind observation (159,938 total observations) was handled in this manner.

The percentage frequency of occurrence of crosswind components within these critical intervals was next calculated for each matrix position by dividing the total number in that position by the total number of observations and multiplying by 100; i.e.,

$$\text{Percent frequency} = (S/T) \times 100 \quad (2)$$

where S is the number of cases within the critical crosswind interval and T is the total number of wind observations for that time interval. These runway crosswind percentage frequencies are given by month in Tables 1.1 through 13.1 for each 3 hour period of the day.

2. Tailwind Procedure. In addition to critical crosswinds adversely affecting the landing of space vehicles and aircraft, headwind reversals (i.e., a headwind changing to a tailwind) also can present problems. Given in this section are percent frequency of occurrence tables that pertain to critical tailwind and tailwind crosswind speeds. The crosswind computations discussed in the last section of this report do not require a specification of the landing direction since a wind component is calculated normal to the runway. This means that a critical crosswind that affects the vehicle from either the left or right side is tallied. However, in analyzing headwinds and tailwinds, the direction of the component parallel to the runway is important. If, for example, it were necessary to land on runway 15 (from northwest), a wind component from the northwest (a tailwind) would be unfavorable. In the computations performed here, parallel runway winds were computed using the following formula:

$$\text{Parallel wind} = \{ \cos | \text{WD-RA} | \times \text{WS} \} \quad (3)$$

where

RA = runway angle measured from true north

WD = wind direction in degrees clockwise from true north

WS = wind speed in knots.

When computing a parallel runway wind, sign is important. If equation (3) gives a positive velocity (+), it defines a tailwind. Conversely, a negative velocity (-) defines a headwind. Critical tailwind interval limits of 1 to 4, 5 to 9, and 10-up knots were used by hour and month in computing the runway tailwind probabilities as given in Tables 1.2 through 13.2. Finally, crosswind-versus-tailwind percentages are given in Tables 1.3 through 13.3 by month and hour for each runway.

3. Headwind Reversal Procedure. In this analysis of runway headwind components an attempt has been made to answer some basic questions concerning 1 hour wind reversal frequencies. For example, (1) What is the probability that the wind component parallel to the runway will reverse direction? (2) Do reversals from northwest to southeast components occur as frequently as southeast to northwest changes? (3) Suppose the wind direction at some specified time is known; what then is the conditional probability of a reversal?

a. **Frequency of Wind Reversals.** To calculate this value it is only necessary to count those cases when the parallel wind component switches from one hour to the next; i.e., if the component goes from (+) to (-) or from (-) to (+), this indicates a switch and is tallied. Dividing this tally by the entire hourly data sample gives a percent frequency (occurrence rate) of the wind reversing on the runway over that time interval. This procedure is expressed in equation (4) as follows:

$$X(I, J) = \frac{100 Y(I, J)}{Z(I, J)} \quad (4)$$

where

X(I, J) = percent frequency of parallel component wind reversal for month I and time period J

$Y(I, J)$ = number of occurrences of parallel wind reversals during month I and time period J

$Z(I, J)$ = total observations during month I and time period J.

The reversal tallies were entered on the resulting hour; i.e., a reversal wind between 0700 and 0800 LST is entered at 0800 LST (the resulting time). However, since hours are combined into time intervals, this was entered as a tally within the 06-08 3 hour time interval. These values are listed in column 1 (TOTAL) of Tables 1.4 through 13.4A.

b. Southeast to Northwest and Northwest to Southeast Reversals.

How often does a southeast wind component reverse to a northwest wind component from 1 hour to the next? To compute these reversals, the number of southeast to northwest component changes are tallied and then divided by the total number of observations for that time period. These values appear in column 2 (HEAD-TAIL) of Tables 1.4 through 13.4A for runway 15 but in column 3 (TAIL-HEAD) for runway 33. Wind component changes from northwest to southeast are calculated in the same way.

c. Conditional Wind Reversals. Given a southeast parallel component wind initially, how often does this southeast wind change into a northwest wind component by the next hour? This third question deals with the conditional statement that given a southeast wind, what is the probability of its changing into a northwest wind; i.e., $P(NW|SE)$. In this third question we must look at only the hourly southeast components in the data sample and then tally the southeast to northwest wind changes over an hour. This tally must be divided by the number of southeast wind components in the sample, not by the total data sample, because prior knowledge of the wind direction is assumed (i.e., southeast winds are set as given initially). See columns 4 and 5 of Tables 1.4 through 13.4A. Likewise, column 5 presents the conditional percentage frequency of a northwest to southeast reversal by using the same method.

In this section the following conditional probability equation was used:¹

$$P(X|Z)_{ij} = \frac{100 Y(I, J)}{Z(I, J)} \quad (5)$$

1. The terminology given here is reversed when considering the probability of a headwind given a tailwind.

where

$P(X|Z)_{ij}$ = conditional probability of the occurrence of a tailwind (X) given a headwind (Z) initially during month I and time J

$Y(I, J)$ = the number of headwind-to-tailwind changes during month I and time period J

$Z(I, J)$ = the total number of headwinds in the month I/time J data sample.

Tables 1.4B through 13.4B also give headwind reversal statistics, but here the statistics are broken out into specified resultant tailwind magnitude categories (i.e., resultant tailwinds of >0-3, 4, 8, >8 knots).

Throughout this headwind reversal section both calm conditions and direct crosswinds were considered as favorable landing conditions.

4. Headwind Component Procedure. Headwind component statistics parallel to the runway are often requested. Computed in Tables 1.5 through 13.5 are cumulative percentage frequencies of headwind components calculated along the runway during daytime hours (06-17 hours). These tables were computed by equation (3), using only those wind observations that displayed a headwind component along the specified runway. This means that for the runway 15 computations, for example, all observations of wind directions from approximately west through north to east (tailwind components) were eliminated. This accounts for the lower number of total observations given in the tables. The component speed column should be interpreted as follows: 0-1 includes speeds from 0 to 0.9 knot; 1-2 contains values from 1.0 to 1.9 knots, etc. Calms are included in the zero category.

E. Explanation of Tables

Tables 1.1 through 13.1, 1.2 through 13.2, and 1.3 through 13.3 of this report are presented as percentages of crosswinds or tailwinds within selected wind speed intervals only. Since probability questions of the type "greater than or equal to a certain value" are usually asked (indicating an accumulated effect), one must add together rows of percentages and, at times, columns as well. Tables 1.4A through 13.4A give the percent of wind reversals for "all" resultant tailwind (or headwind) magnitudes, whereas Tables 1.4B through 13.4B break out the reversal statistics into specified tailwind categories.

The critical crosswind or tailwind speed interval headings, 1 to 4, 5 to 9, etc., are to be interpreted as 1 through 4 knots, 5 through 9 knots, etc. Also, zero crosswinds are classified as all winds that are (1) calm, (2) < 1 knot, and (3) parallel to the runway. Zero tailwinds have not been tabulated, but all tailwinds > 0 knots and < 1 knot were placed within the 1 to 4 knot classification interval during data analysis. The time intervals given (i.e., 00-02, etc.) indicate eight 3 hour intervals, and they are expressed in LST.

1. Crosswind Example. Tables 1.1 through 13.1 give percentages of critical crosswind occurrences within critical crosswind speed intervals versus hour of day for the runway and month. Since runway end number does not matter when computing crosswinds, the runway is listed as 15-33 on these tables. Examples follow concerning the use of Tables 1.1 through 13.1 in which crosswind occurrence percentages can be easily calculated by summing up percentages in the appropriate row. For runway 15-33 between hours 00-02 for the April reference period, Table 4.1 gives a 45.31 percent chance of encountering a crosswind \geq 5 knots. One must add $40.80 + 3.33 + 0.68 + 0.25 + 0.25 = 45.31$. This also means that 54.69 percent (i.e., $50.99 + 3.70 = 54.69$) of the crosswinds are < 5 knots. Similarly, crosswind percentages \geq 20 knots can be computed for all hours on runway 15-33 by adding, on the 00-23 line (under HRS), $0.36 + 0.30$ to arrive at a percentage of 0.66. In this same category, zero crosswinds (calm conditions, crosswinds < 1 knot, or winds parallel to the runway) occur 2.18 percent of the time.

2. Tailwind Example. Tables 1.2 through 13.2 give percentage frequencies of tailwind components within critical tailwind speed intervals versus hour of day for the runway heading and month. Since landing direction does play a part in the computation of tailwinds (or headwinds), the runway is listed as 15 and 33, indicating the approach direction (i.e., 15 is landing into 150 degrees from the northwest end of the runway). Some examples follow that indicate the use of Tables 1.2 through 13.2. Again, the format of the tables is similar to that of Tables 1.1 through 13.1, and the tailwind statistics presented are not accumulated. The April tailwind percentage \geq 5 knots between 00-02 hours LST for runway 15 as presented on the left side of Table 4.2 is 0.87 ($0.62 + 0.25 = 0.87$). The companion table of 4.2 indicates a tailwind percentage of 78.71 for runway 33 for the same specified conditions. The 78.71 percent on runway 33 can also be interpreted as the percentage of headwinds on runway 15. A tailwind on one runway heading (33) is a headwind on the other end of the runway (15). Combined percentiles for all hours can be obtained from the 00-23 row.

Tables 1.3 through 13.3 give percentages for the joint occurrence of winds within selected crosswind versus tailwind speed intervals. These monthly tables are presented for each end of the runway and are displayed by hour of day (LST). Tables 1.3 through 13.3 offer the advantage of obtaining percentages by choosing the critical crosswind and tailwind limits concurrently, not separately. That is, suppose both crosswinds and tailwinds ≥ 5 knots are critical to a landing operation for 00 hours during April on runway 15, one would find the intersection number that pertains to the intervals of crosswind 5 to 9 and tailwind 5 to 9. In this case, the number in Table 4.3 is 0.56 percent. This is not the percentage number needed since these table percentages, again, are not accumulated. Therefore, one must sum all the tailwind rows ≥ 5 knots that encompass all crosswind values ≥ 5 knots. This will satisfy the required condition. Figure 5 illustrates the Table 4.3 example in more detail in that the percentage numbers to be added are enclosed by dashed lines. The total required sum of these ten numbers is 0.94, which is the required percentage.

RUNWAY 15, HOUR 0, KSC, FLORIDA, APRIL

| TAILWIND LIMITS | CROSSWIND LIMITS | | | | | | ZERO CROSS | TOTAL ² |
|-----------------|-------------------|------|-------|-------|-------|-------|------------|--------------------|
| | 1-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-UP | | |
| 1-4 | 1.11 | 0.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | *** * 1.86 * |
| 5-9 | 0.00 ^a | 0.56 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | * 0.74 * |
| 10-UP | 0.00 | 0.00 | 0.00 | 0.19 | 0.00 | 0.00 | 0.00 | * 0.19 * |
| TOTAL | 1.11 | 1.30 | 0.19 | 0.19 | 0.00 | 0.00 | 0.00 | * 2.78 * |

a. TOTAL PERCENTAGES WITHIN DASHED (-) AREA = 0.94 PERCENT.

Figure 5. KSC crosswind tailwind speed interval percentages.

Since Tables 1.3 through 13.3 are the most involved of the tables presented thus far, a few notes of caution are issued that one should remember while using them. The total row and column offer a sum of all rows or columns, respectively. The total column (of Tables 1.3 through 13.3) has also added into it all the zero crosswind percentages. The percentage numbers enclosed by asterisks in Figure 5 show the percent frequency of tailwinds without regard to crosswind components. An example of using the total row follows. If one needs the percentage of all crosswinds ≥ 5 knots on runway 15 at 00 hours in April which encompasses all tailwind categories, he can sum the numbers 1.30, 0.19, 0.19, 0.00, and 0.00 to arrive at 1.68 percent. Why is this value so much less

2. The tabular numbers may not total exactly because of computer round-off.

than the 45.31 00-02 hour percentage of crosswinds > 5 knots on runway 15-33 from Table 4.1? The answer is that the 1.68 percent corresponds to crosswinds ≥ 5 knots with regard to all tailwind categories. Tables 1.1 through 13.1 give crosswinds ≥ 5 knots with regard to all parallel winds (tail and head combined). To obtain comparable numbers, one must calculate from Table 4.3 the crosswind percentage ≥ 5 knots (44.45 percent) with regard to all tailwinds on runway heading 33 (a headwind on runway 15) and add the two percentages ($1.68 + 44.45$) to arrive at 46.13 percent, which corresponds closely to Table 4.1 values. The numbers will not be exact because Tables 1.1 through 13.1 and 1.2 through 13.2 give statistics in 3 hour groups, while Tables 1.3 through 13.3 are by each individual hour. Both tailwinds and headwinds from Tables 1.3 through 13.3 may have to be used depending upon the application.

3. Headwind Reversal Example. Tables 1.4A through 13.4A give the percentage of parallel runway wind reversals that answer the three questions posed earlier in this report concerning different runway wind reversal classifications. These tables present the probabilities for each runway end by month and 3 hour time period. Column 1 answers question 1 and gives the total reversals for all observations (within time and month category). Columns 2 and 3 answer question 2 by giving the percent frequency of headwind-to-tailwind and tailwind-to-headwind reversals, respectively, for all observations. Question 3 on conditional probability is answered in columns 4 and 5. It should be noted that the statistics presented in Tables 1.4A through 13.4A deal with the probability of reversals without regard to the resulting parallel-wind magnitude classification, as presented in Reference 1. This means, for example, that the columns regarding headwind-to-tailwind reversals (columns 2 and 4) were computed for all resultant tailwind components. On the "A" tables, all magnitudes of the resultant tailwinds were combined before the statistics were computed. However, Tables 1.4B through 13.4B present these same reversal statistics with respect to different categories of the resultant tailwind magnitudes.

These statistics should prove valuable to both the mission planner and the operational control authority because they are based upon a prior knowledge of the wind-type information that will be available during the mission. For example, consider a landing planned for 1000 LST in April on runway 15. Assume that the wind observed at 0900 LST is known to have a headwind component along that runway. Table 4.4A, column 4, indicates that 2.36 percent of those wind observations changed to such an extent that at the following hour (1000 LST) there was a tailwind component on runway 15. This percentage can also be obtained from the appropriate total column of Table 4.4B. Restated in terms of risk: with a known headwind component at 0900 LST, the risk of change to a tailwind component at 1000 LST is approximately 2 percent. Of course, this risk statement does not consider the forecast capability that would be utilized in the real-time operation.

If the investigator were interested in the percent of headwind reversals of all reversals which resulted in a tailwind of > 4 knots, this can be obtained from Table 4.4B by adding 1.31 and 0.98 to arrive at 2.29 percent.

4. Headwind Component Example. Tables 1.5 through 13.5 give cumulative percentage frequencies of headwind components along the runway during the daytime hours. The use of the tables is illustrated by the following example: "What is the risk of a headwind component > 15 knots on runway 15 at 12-14 hours in April?" Table 4.5 shows that 91.25 percent of the headwind observations were ≤ 20.9 knots. Conversely, there is a 8.75 percent risk of speeds ≥ 21 knots. "What is the 95 percentile headwind component speed from the same table?" Interpolation between 94.21 and 95.47 for 95 results in a speed of approximately 22 knots.

IV. CONCLUSION

In summary, this report provides different types of wind statistics applicable to the KSC, Florida area. Ground-level wind statistics are given computed with regard to the KSC Space Shuttle runway orientation. Crosswinds, tailwinds, headwinds, and headwind reversals are the different parameters computed by critical class intervals for hour, month, and runway. If cumulative percentage results are needed, one must follow the procedures given in this report and accumulate the appropriate percentages. The reader should consult Reference 1 for a further discussion concerning some small sources of error introduced by the use of peak wind data samples.

Further climatological and wind information involving the KSC area can be obtained from References 5 through 8.

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JANUARY

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TABLE 1.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE
FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| RUNWAY 15 - 33 | KSC PEAK WINDS MONTH OF JAN. | | | | | TOTAL NUMBER OBS. | | |
|----------------|--------------------------------------|--------|----------|----------|----------|-------------------|----------------|-------------------|
| | CROSSWINDS | | | | | | | |
| | ***** CRITICAL LIMITS IN KNOTS ***** | | | | | | | |
| HRS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | ZERO CROSSWIND | TOTAL NUMBER OBS. |
| 00-02 | 47.61 | 31.82 | 5.85 | 2.63 | .90 | .06 | 11.53 | 1674 |
| 03-05 | 46.71 | 30.05 | 7.11 | 3.05 | 1.19 | .15 | 11.71 | 1674 |
| 06-08 | 43.31 | 32.74 | 7.65 | 2.69 | .90 | .18 | 12.54 | 1674 |
| 09-11 | 25.69 | 45.52 | 12.07 | 5.85 | 1.61 | .18 | 9.08 | 1674 |
| 12-14 | 19.77 | 51.31 | 12.01 | 5.85 | 1.43 | .54 | 8.24 | 1674 |
| 15-17 | 27.08 | 49.07 | 10.22 | 3.95 | 1.43 | .12 | 8.07 | 1673 |
| 18-20 | 48.45 | 31.42 | 6.27 | 2.57 | .72 | .12 | 10.45 | 1674 |
| 21-23 | 47.07 | 33.21 | 4.12 | 4.81 | .66 | .12 | 12.01 | 1674 |
| 00-23 | 38.21 | 38.09 | 8.16 | 3.67 | 1.21 | .19 | 10.45 | 13391 |

TABLE 1.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE
FREQUENCIES BY RUNWAY END

| RUNWAY 15 | KSC PEAK WINDS MONTH OF JAN. | | | | | TOTAL NUMBER OBS. | |
|-----------|--------------------------------------|--------|----------|----------|----------|-------------------|-------------------|
| | TAILWINDS | | | | | | |
| | ***** CRITICAL LIMITS IN KNOTS ***** | | | | | | |
| HRS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | TOTAL NUMBER OBS. |
| 00-02 | 4.66 | 3.46 | 1.97 | 1.97 | 1.674 | 1674 | 24.49 |
| 03-05 | 5.20 | 3.76 | 2.15 | 2.15 | 1674 | 1674 | 25.69 |
| 06-08 | 5.84 | 3.76 | 2.57 | 2.57 | 1674 | 1674 | 26.58 |
| 09-11 | 2.33 | 7.35 | 3.82 | 3.82 | 1674 | 1674 | 11.17 |
| 12-14 | .72 | 5.02 | 5.68 | 5.68 | 1674 | 1674 | 4.96 |
| 15-17 | .72 | 3.89 | 4.90 | 4.90 | 1673 | 1673 | 4.60 |
| 18-20 | 4.72 | 5.50 | 2.81 | 2.81 | 1674 | 1674 | 21.03 |
| 21-23 | 5.97 | 4.54 | 1.97 | 1.97 | 1674 | 1674 | 21.92 |
| 00-23 | 3.72 | 4.66 | 3.23 | 3.23 | 13391 | 13391 | 17.56 |

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TABLE 1.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
|----------------|------|--------------------------|--------|----------|----------|----------|--------------------------|------------|--------|--------|----------|----------|----------|--------|------------|-------|
| MONTH OF JAN. | | MONTH OF JAN. | | | | | | | | | | | | | | |
| HOUR 0 | | NUMBER OBS. 558 | | | | | NUMBER OBS. 558 | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 2.15 | 2.87 | .00 | .00 | .00 | .00 | .00 | 5.02 | 16.67 | 3.76 | 1.43 | .54 | 1.08 | .00 | .72 | 24.19 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.97 | 27.78 | .90 | .00 | .36 | .00 | .00 | 1.61 | 30.65 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.25 | .72 | 24.55 | 1.79 | .00 | .00 | .00 | .18 | 27.24 |
| TOTAL | 2.15 | 3.76 | 1.97 | 1.08 | .18 | .00 | .00 | 9.14 | 45.16 | 29.21 | 3.23 | .90 | 1.08 | .00 | 2.51 | 82.08 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
| MONTH OF JAN. | | MONTH OF JAN. | | | | | | | | | | | | | | |
| HOUR 1 | | NUMBER OBS. 558 | | | | | NUMBER OBS. 558 | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 2.15 | 2.15 | .00 | .00 | .00 | .00 | .00 | 4.30 | 17.38 | 3.41 | 1.61 | .54 | .36 | .18 | 1.43 | 24.91 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.76 | 27.78 | .72 | .18 | .00 | .00 | .00 | 1.43 | 30.11 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.97 | 1.25 | 23.12 | 2.15 | .00 | .00 | .00 | .36 | 26.88 |
| TOTAL | 2.15 | 3.76 | 2.15 | 1.79 | .18 | .00 | .00 | 10.04 | 46.42 | 27.24 | 3.94 | .54 | .36 | .18 | 3.23 | 81.90 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
| MONTH OF JAN. | | MONTH OF JAN. | | | | | | | | | | | | | | |
| HOUR 2 | | NUMBER OBS. 558 | | | | | NUMBER OBS. 558 | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 1.61 | 2.87 | .00 | .00 | .00 | .00 | .18 | 4.66 | 15.95 | 3.41 | 1.43 | 1.08 | .54 | .00 | 1.97 | 24.37 |
| 5 TO 9 | .00 | 1.43 | .00 | .00 | .00 | .00 | .00 | 3.76 | 28.18 | .72 | .36 | .00 | .00 | .00 | 1.79 | 31.00 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.69 | 1.25 | 21.86 | 2.33 | .00 | .00 | .00 | .18 | 25.63 |
| TOTAL | 1.61 | 4.30 | 2.15 | 2.51 | .36 | .00 | .18 | 11.11 | 45.34 | 25.99 | 4.12 | 1.08 | .54 | .00 | 3.94 | 81.00 |

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TABLE 1.3. (Continued)

| KSC PEAK WINDS | | | | | | | | | | | | | |
|---|------|------|------|------|-------|-------|-------|------|------|------|-----|------|-------|
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF JAN. | | | | | | | | | | | | | |
| NUMBER OBS. 558 | | | | | | | | | | | | | |
| HOUR 3 | | | | | | | | | | | | | |
| JANUARY 33 | | | | | | | | | | | | | |
| SEE CROSSWIND LIMITS | | | | | | | | | | | | | |
| 1 TO 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | |
| TOTAL 0 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | | |
| 1 TO 4 | 1.61 | 3.41 | .00 | .00 | 5.02 | 15.96 | 3.23 | 1.79 | .90 | .54 | .18 | 1.79 | 24.37 |
| 5 TO 9 | .07 | 1.25 | .93 | .10 | 3.28 | 29.03 | .72 | .00 | .36 | .00 | .00 | 1.79 | 31.90 |
| 10-14 | .00 | .00 | .36 | .00 | 1.97 | 1.08 | 20.43 | 2.15 | .18 | .00 | .00 | .00 | 23.84 |
| TOTAL | 1.61 | 4.66 | 2.51 | 1.25 | 10.57 | 46.06 | 24.37 | 3.94 | 1.43 | .54 | .18 | 3.58 | 80.11 |
| KSC PEAK WINDS | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF JAN. | | | | | | | | | | | | | |
| NUMBER OBS. 558 | | | | | | | | | | | | | |
| HOUR 4 | | | | | | | | | | | | | |
| JANUARY 33 | | | | | | | | | | | | | |
| SEE CROSSWIND LIMITS | | | | | | | | | | | | | |
| 1 TO 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | |
| TOTAL 0 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | | |
| 1 TO 4 | 2.97 | 2.87 | .00 | .00 | 5.73 | 15.41 | 4.30 | 2.69 | 1.20 | 1.00 | .00 | 1.25 | 25.01 |
| 5 TO 9 | .00 | 1.43 | .66 | .60 | 3.23 | 26.04 | .54 | .18 | .54 | .00 | .00 | .36 | 28.49 |
| 10-14 | .00 | .00 | .54 | .18 | 1.79 | .90 | 22.54 | 2.51 | .00 | .00 | .00 | .36 | 25.01 |
| TOTAL | 2.97 | 4.30 | 1.43 | 1.47 | 10.75 | 43.19 | 26.04 | 5.30 | 1.81 | 1.00 | .00 | 1.97 | 80.11 |
| KSC PEAK WINDS | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF JAN. | | | | | | | | | | | | | |
| NUMBER OBS. 558 | | | | | | | | | | | | | |
| HOUR 5 | | | | | | | | | | | | | |
| JANUARY 33 | | | | | | | | | | | | | |
| SEE CROSSWIND LIMITS | | | | | | | | | | | | | |
| 1 TO 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | |
| TOTAL 0 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | | |
| 1 TO 4 | 3.27 | 1.61 | .00 | .00 | 4.84 | 15.41 | 5.91 | 1.79 | .90 | .72 | .36 | 1.79 | 26.08 |
| 5 TO 9 | .00 | 1.25 | 2.51 | .72 | 4.48 | 26.52 | .90 | .00 | .00 | .00 | .00 | .72 | 28.14 |
| 10-14 | .00 | .00 | 1.08 | .54 | 2.69 | 1.25 | 20.25 | 2.69 | .18 | .00 | .00 | .00 | 24.37 |
| TOTAL | 3.27 | 2.87 | 3.58 | 1.79 | 12.01 | 43.19 | 27.06 | 4.48 | 1.08 | .72 | .36 | 2.51 | 79.59 |

TABLE 1.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | KSC PEAK WINDS | | | | | |
|-----------------|------|--------------------------|--------|----------|----------|----------|--------------------------|------------|-------|--------|--------|-----------------|----------|----------|--------|------------|-------|
| MONTH OF JAN. | | MONTH OF JAN. | | | | | | | | | | MONTH OF JAN. | | | | | |
| HOUR 6 | | HOUR 6 | | | | | | | | | | HOUR 7 | | | | | |
| NUMBER OBS. 558 | | NUMBER OBS. 558 | | | | | | | | | | NUMBER OBS. 558 | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 2.69 | 1.97 | .00 | .00 | .00 | .00 | .00 | 4.66 | 15.05 | 5.56 | 2.33 | .72 | .72 | .00 | .00 | 2.51 | 26.08 |
| 5 TO 9 | .00 | 2.15 | .72 | .18 | .00 | .00 | .00 | 3.76 | 24.55 | .36 | .00 | .36 | .00 | .00 | .72 | 25.99 | |
| 10- UP | .00 | .00 | 1.25 | 1.43 | .18 | .00 | .00 | 2.87 | 1.25 | 22.22 | 3.05 | .00 | .00 | .00 | .00 | 26.52 | |
| TOTAL | 2.69 | 4.12 | 1.97 | 2.15 | .36 | .00 | .00 | 11.29 | 40.86 | 28.14 | 5.38 | 1.08 | .72 | .00 | 3.23 | 79.39 | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 1.97 | 3.94 | .00 | .00 | .00 | .00 | .00 | 5.91 | 14.52 | 5.02 | 2.15 | 1.08 | .72 | .18 | .00 | 2.87 | 26.52 |
| 5 TO 9 | .00 | 1.97 | 1.97 | .18 | .00 | .00 | .00 | 4.12 | 26.34 | .36 | .18 | .00 | .00 | .00 | .72 | 27.60 | |
| 10- UP | .00 | .00 | 1.61 | 1.08 | .54 | .00 | .00 | 3.23 | 1.79 | 20.07 | 1.61 | .00 | .00 | .00 | .00 | 23.48 | |
| TOTAL | 1.97 | 5.91 | 3.58 | 1.25 | .54 | .00 | .00 | 13.26 | 42.65 | 25.45 | 3.94 | 1.08 | .72 | .18 | 3.58 | 77.60 | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 2.33 | 3.41 | .00 | .70 | .00 | .00 | .00 | 5.73 | 12.90 | 5.66 | 3.76 | .72 | .36 | .36 | .00 | 2.69 | 26.34 |
| 5 TO 9 | .00 | 1.25 | .72 | 1.43 | .00 | .00 | .00 | 3.41 | 25.45 | .72 | .36 | .00 | .00 | .00 | .00 | .54 | 27.06 |
| 10- UP | .00 | .00 | 1.43 | .18 | .00 | .00 | .00 | 1.61 | 1.08 | 23.66 | 1.79 | .18 | .00 | .00 | .18 | 26.88 | |
| TOTAL | 2.33 | 4.66 | 2.15 | 1.61 | .00 | .00 | .00 | 10.75 | 39.43 | 29.93 | 5.91 | .90 | .36 | .36 | 3.41 | 80.29 | |

TABLE 1.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JAN. | | NUMBER OBS. | | 558 | | | | |
|----------------|------------|-------------------------|-------|------------------|--------|-------------|----------|----------|--------|------------|-------|--|
| HOUR 12 | ZERO CROSS | 25- UP | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | |
| | | | | PUNWAY 33 | | | | | | | | |
| | | | | CROSSWIND LIMITS | | | | | | | | |
| | | | | PERCENTAGES | | | | | | | | |
| 1 TO 4 | .18 | .36 | .54 | .72 | .90 | 1.08 | 1.25 | 1.43 | .36 | .00 | 5.73 | |
| 5 TO 9 | .20 | 1.04 | 1.24 | 1.61 | 1.95 | 2.36 | 2.72 | 3.08 | .00 | .36 | 18.64 | |
| 10-14 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 55.56 | |
| TOTAL | .18 | 1.40 | 1.58 | 1.76 | 2.15 | 2.61 | 3.15 | 3.72 | .36 | .36 | 79.93 | |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JAN. | | NUMBER OBS. | | 558 | | | | |
|----------------|------------|-------------------------|-------|------------------|--------|-------------|----------|----------|--------|------------|-------|--|
| HOUR 13 | ZERO CROSS | 25- UP | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | |
| | | | | PUNWAY 33 | | | | | | | | |
| | | | | CROSSWIND LIMITS | | | | | | | | |
| | | | | PERCENTAGES | | | | | | | | |
| 1 TO 4 | .00 | .00 | .00 | .54 | .72 | 1.08 | 1.25 | .72 | .00 | .00 | 6.04 | |
| 5 TO 9 | .00 | .00 | .00 | 1.61 | 1.95 | 2.36 | 2.72 | .54 | .00 | .36 | 18.64 | |
| 10-14 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 57.35 | |
| TOTAL | .00 | .00 | .00 | 1.79 | 2.15 | 2.61 | 3.15 | 1.97 | .18 | .36 | 87.65 | |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JAN. | | NUMBER OBS. | | 510 | | | | |
|----------------|------------|-------------------------|-------|------------------|--------|-------------|----------|----------|--------|------------|-------|--|
| HOUR 14 | ZERO CROSS | 25- UP | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | |
| | | | | PUNWAY 33 | | | | | | | | |
| | | | | CROSSWIND LIMITS | | | | | | | | |
| | | | | PERCENTAGES | | | | | | | | |
| 1 TO 4 | .00 | .36 | .36 | 1.25 | .54 | .72 | 1.08 | .36 | .36 | .00 | 4.30 | |
| 5 TO 9 | .00 | 1.61 | 1.61 | 1.79 | 1.95 | 2.15 | 2.36 | .18 | .00 | .18 | 20.07 | |
| 10-14 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 56.99 | |
| TOTAL | .00 | 1.97 | 2.03 | 2.24 | 2.49 | 2.61 | 2.72 | 1.97 | .72 | .54 | 81.36 | |

TABLE 1.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | |
|-----------------|--------|-------------------------|------------|----------|------------|----------|------------------|--------|------------|----------|----------|
| MONTH OF JAN. | | MONTH OF JAN. | | | | | | | | | |
| HOUR 18 | | NUMBER OBS. 558 | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 |
| 5 TO 9 | 10-UP | TOTAL | ZERO CROSS | 25-UP | ZERO CROSS | TOTAL | ZERO CROSS | 25-UP | ZERO CROSS | TOTAL | |
| PERCENTAGES | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | |
| PERCENTAGES | | 15 TO 19 | | | | | 20 TO 24 | | | | |
| 1 TO 4 | 2.69 | 1.43 | .00 | .00 | .00 | 4.12 | 14.87 | 1.08 | 1.08 | .72 | .18 |
| 5 TO 9 | .00 | 1.79 | 1.61 | .18 | .00 | 5.02 | 29.75 | 1.08 | .36 | .18 | |
| 10-UP | .00 | .00 | 2.51 | .54 | .72 | 3.76 | .18 | 24.73 | 3.23 | .00 | |
| TOTAL | 2.69 | 3.23 | 3.94 | 2.15 | .90 | 12.90 | 44.80 | 26.88 | 4.66 | .90 | |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | |
| MONTH OF JAN. | | MONTH OF JAN. | | | | | | | | | |
| HOUR 19 | | NUMBER OBS. 558 | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 |
| 5 TO 9 | 10-UP | TOTAL | ZERO CROSS | 25-UP | ZERO CROSS | TOTAL | ZERO CROSS | 25-UP | ZERO CROSS | TOTAL | |
| PERCENTAGES | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | |
| PERCENTAGES | | 15 TO 19 | | | | | 20 TO 24 | | | | |
| 1 TO 4 | 3.58 | 1.79 | .00 | .00 | .00 | 5.38 | 17.20 | 1.97 | .72 | .18 | |
| 5 TO 9 | .00 | 3.05 | 1.25 | 1.61 | .00 | 5.91 | 29.57 | 1.08 | .18 | .00 | |
| 10-UP | .00 | .00 | 1.43 | .72 | .36 | 2.51 | .18 | 22.58 | 1.61 | .00 | |
| TOTAL | 3.58 | 4.84 | 2.69 | 2.33 | .36 | 13.80 | 46.95 | 25.63 | 2.51 | .18 | |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | |
| MONTH OF JAN. | | MONTH OF JAN. | | | | | | | | | |
| HOUR 20 | | NUMBER OBS. 558 | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 |
| 5 TO 9 | 10-UP | TOTAL | ZERO CROSS | 25-UP | ZERO CROSS | TOTAL | ZERO CROSS | 25-UP | ZERO CROSS | TOTAL | |
| PERCENTAGES | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | |
| PERCENTAGES | | 15 TO 19 | | | | | 20 TO 24 | | | | |
| 1 TO 4 | 3.58 | 1.08 | .00 | .00 | .00 | 4.66 | 17.39 | 1.79 | 1.08 | .36 | |
| 5 TO 9 | .00 | 3.23 | 1.25 | 1.61 | .00 | 5.56 | 24.16 | 1.25 | .18 | .00 | |
| 10-UP | .00 | .00 | 1.08 | .72 | .36 | 2.15 | .19 | 26.34 | 1.43 | .00 | |
| TOTAL | 3.58 | 4.30 | 2.33 | 1.79 | .36 | 12.37 | 43.73 | 29.39 | 2.69 | .36 | |

TABLE 1.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

MSC PEAK WINDS HEAD/TAIL WIND REVERSALS MONTH OF JAN.

| HRS | 000 RUNWAY 15 000 | | | | 000 RUNWAY 33 000 | | | | | |
|-------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-------|------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | | |
| 00-02 | 6.62 | 4.57 | 4.37 | 5.05 | 4.72 | 9.99 | 4.67 | 5.33 | 25.57 | 6.52 |
| 03-04 | 0.34 | 4.79 | 4.55 | 5.34 | 41.06 | 19.77 | 5.27 | 5.51 | 26.19 | 6.09 |
| 05-08 | 10.71 | 5.86 | 4.85 | 6.64 | 41.54 | 12.99 | 6.16 | 6.82 | 29.60 | 8.62 |
| 09-11 | 11.97 | 5.57 | 6.46 | 6.62 | 47.98 | 12.03 | 6.46 | 5.57 | 30.08 | 7.09 |
| 12-14 | 9.04 | 4.19 | 4.85 | 4.72 | 42.86 | 9.16 | 4.97 | 4.19 | 23.78 | 5.19 |
| 15-17 | 7.96 | 4.49 | 3.47 | 4.96 | 36.71 | 8.38 | 3.59 | 4.79 | 20.76 | 5.79 |
| 18-20 | 9.58 | 5.07 | 4.55 | 5.78 | 34.86 | 10.05 | 4.79 | 5.27 | 22.35 | 6.70 |
| 21-23 | 8.60 | 3.53 | 5.27 | 4.04 | 42.11 | 10.47 | 6.04 | 4.93 | 28.77 | 5.61 |
| 20-23 | 9.50 | 4.75 | 4.75 | 5.37 | 41.13 | 10.48 | 5.24 | 5.24 | 26.27 | 6.54 |

1AA

MSC PEAK WINDS HEAD/TAIL WIND REVERSALS MONTH OF JAN.

| HRS | 000 RUNWAY 15 000 | | | 000 RUNWAY 33 000 | | |
|-------|-------------------|------------------------------|-------|-------------------|------------------------------|-------|
| | GIVEN A HEADWIND | RESULTANT TAILWIND MAGNITUDE | TOTAL | GIVEN A HEADWIND | RESULTANT TAILWIND MAGNITUDE | TOTAL |
| 00-02 | 2.13 | 1.86 | 1.36 | 5.57 | 6.23 | 25.57 |
| 03-04 | 2.42 | 1.82 | 1.14 | 3.87 | 6.85 | 26.19 |
| 05-08 | 2.10 | 3.39 | 1.15 | 6.61 | 8.33 | 29.60 |
| 09-11 | .35 | 3.25 | 2.43 | 5.01 | 18.79 | 30.08 |
| 12-14 | .27 | 1.82 | 2.63 | 1.24 | 16.94 | 25.78 |
| 15-17 | .79 | 2.05 | 2.12 | 1.04 | 13.84 | 20.76 |
| 18-20 | 1.93 | 2.62 | 1.24 | 5.59 | 7.26 | 22.35 |
| 21-23 | 1.85 | 1.50 | .68 | 6.84 | 6.55 | 28.77 |
| 20-23 | 1.48 | 2.28 | 1.61 | 4.57 | 10.76 | 26.27 |

1AB

TABLE 1.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY COMPONENT CLASS (KNOTS) | HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF JAN. | | | | | | | | | | | |
|--------------------------------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | MSC PEAK WINDS | | | RUMWAY 15 | | | RUMWAY 33 | | | RUMWAY 35 | | |
| | HOURS 06-08 CPF | HOURS 09-11 CPF | HOURS 12-14 CPF | HOURS 15-17 CPF | HOURS 06-17 CPF | HOURS 09-11 CPF | HOURS 12-14 CPF | HOURS 15-17 CPF | HOURS 06-17 CPF | HOURS 09-11 CPF | HOURS 12-14 CPF | HOURS 15-17 CPF |
| 7-1 | 17.06 | 12.15 | 9.64 | 9.05 | 11.96 | 94.00 | 37.57 | 41.05 | 45.17 | 41.78 | | |
| 1-2 | 23.56 | 16.64 | 12.54 | 10.77 | 15.84 | 46.86 | 38.12 | 41.05 | 45.17 | 42.68 | | |
| 3-3 | 27.56 | 18.23 | 13.42 | 11.23 | 17.56 | 55.14 | 40.33 | 41.98 | 46.21 | 45.93 | | |
| 3-4 | 34.53 | 19.96 | 13.69 | 12.75 | 20.14 | 61.71 | 42.54 | 42.90 | 47.59 | 48.79 | | |
| 4-5 | 40.49 | 22.31 | 14.57 | 13.74 | 22.71 | 69.71 | 48.34 | 44.75 | 49.31 | 53.32 | | |
| 5-6 | 47.19 | 25.90 | 15.71 | 17.31 | 26.46 | 74.86 | 58.56 | 49.69 | 54.83 | 59.08 | | |
| 6-7 | 52.78 | 29.35 | 17.53 | 21.14 | 30.12 | 77.43 | 63.26 | 53.07 | 57.93 | 63.37 | | |
| 7-8 | 57.75 | 33.22 | 20.09 | 27.54 | 34.60 | 82.29 | 68.51 | 58.31 | 62.07 | 68.25 | | |
| 8-9 | 62.76 | 37.91 | 24.98 | 33.36 | 39.56 | 85.14 | 74.86 | 63.27 | 65.17 | 72.62 | | |
| 9-10 | 70.95 | 47.17 | 36.08 | 45.57 | 49.92 | 87.71 | 82.32 | 70.68 | 71.72 | 78.58 | | |
| 10-11 | 74.75 | 54.28 | 43.36 | 52.14 | 56.11 | 90.29 | 85.04 | 75.00 | 76.21 | 82.05 | | |
| 11-12 | 77.79 | 59.32 | 49.29 | 57.79 | 61.03 | 92.00 | 87.57 | 79.32 | 79.31 | 84.92 | | |
| 12-13 | 81.52 | 65.54 | 56.24 | 66.51 | 67.44 | 92.86 | 91.16 | 85.19 | 85.52 | 88.91 | | |
| 13-14 | 83.21 | 70.10 | 61.56 | 71.53 | 71.60 | 93.14 | 91.99 | 87.35 | 87.59 | 90.20 | | |
| 14-15 | 85.44 | 74.52 | 67.84 | 75.43 | 75.80 | 95.43 | 94.75 | 90.43 | 92.84 | 92.84 | | |
| 15-16 | 87.81 | 78.66 | 73.30 | 79.13 | 79.72 | 96.57 | 96.41 | 91.90 | 94.72 | 94.72 | | |
| 16-17 | 89.30 | 83.15 | 77.68 | 82.89 | 83.25 | 98.29 | 97.79 | 95.68 | 97.06 | 97.06 | | |
| 17-18 | 91.20 | 85.84 | 81.66 | 85.07 | 85.93 | 98.29 | 97.79 | 94.46 | 96.90 | 97.89 | | |
| 18-19 | 94.18 | 89.99 | 86.31 | 89.56 | 90.00 | 99.14 | 99.45 | 99.38 | 97.24 | 98.87 | | |
| 19-20 | 96.28 | 93.51 | 91.98 | 93.73 | 93.87 | 99.71 | 100.00 | 99.69 | 98.62 | 99.55 | | |
| 20-21 | 97.36 | 95.37 | 93.73 | 94.98 | 95.36 | 100.00 | 100.00 | 100.00 | 99.31 | 99.85 | | |
| 21-22 | 98.24 | 96.96 | 95.35 | 96.30 | 96.71 | 100.00 | 100.00 | 100.00 | 99.31 | 99.85 | | |
| 22-23 | 98.51 | 97.65 | 96.43 | 96.96 | 97.38 | 100.00 | 100.00 | 100.00 | 99.66 | 99.92 | | |
| 23-24 | 98.85 | 98.41 | 97.64 | 97.89 | 98.19 | 100.00 | 100.00 | 100.00 | 99.66 | 99.92 | | |
| 24-25 | 99.26 | 98.83 | 98.18 | 98.41 | 98.72 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | |
| 25-26 | 99.39 | 99.24 | 98.72 | 99.01 | 99.09 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | |
| 26-27 | 99.66 | 99.45 | 99.19 | 99.21 | 99.38 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | |
| 27-28 | 99.66 | 99.65 | 99.59 | 99.54 | 99.56 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | |
| 28-29 | 99.73 | 99.86 | 99.53 | 99.60 | 99.68 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | |
| 29-30 | 99.80 | 100.00 | 99.73 | 99.93 | 99.86 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | |
| 30-31 | 99.86 | 100.00 | 99.87 | 99.93 | 99.92 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | |
| 31-32 | 99.93 | 100.00 | 100.00 | 99.93 | 99.97 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | |
| 32-33 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | |
| TOTALS | 1477 | 1448 | 1483 | 1519 | 5922 | 350 | 362 | 324 | 290 | 1326 | | |

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TABLE 2.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| HRS | MSC PEAK WINDS MONTH OF FEB. | | | | | | | | | | TOTAL NUMBER ORS. |
|-------|------------------------------|--------|----------|----------|----------|----------------|--------|--------|----------|----------|-------------------|
| | CROSSWIND | | | | | ZERO CROSSWIND | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | 1 TO 4 | 5 TO 9 | 10 ABOVE | 10 ABOVE | |
| 00-02 | 47.22 | 31.43 | 6.48 | 1.96 | .65 | .25 | 12.05 | | | | 1527 |
| 03-05 | 45.54 | 32.68 | 6.89 | 2.29 | .79 | .37 | 11.72 | | | | 1527 |
| 06-08 | 43.29 | 33.27 | 7.86 | 2.16 | 1.38 | .20 | 11.65 | | | | 1527 |
| 09-11 | 24.17 | 46.76 | 11.98 | 5.30 | 1.90 | .65 | 9.23 | | | | 1527 |
| 12-14 | 15.13 | 54.55 | 14.47 | 4.39 | 2.10 | .79 | 8.58 | | | | 1527 |
| 15-17 | 22.07 | 49.77 | 14.84 | 4.39 | 1.77 | .52 | 8.64 | | | | 1527 |
| 18-20 | 41.91 | 35.23 | 7.53 | 3.27 | .98 | .07 | 11.00 | | | | 1527 |
| 21-23 | 44.89 | 33.94 | 6.68 | 4.77 | .52 | .00 | 12.19 | | | | 1526 |
| 00-23 | 35.53 | 39.71 | 9.34 | 3.19 | 1.26 | .31 | 10.66 | | | | 12215 |

TABLE 2.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| HRS | RUNWAY 15 TAILWIND | | | | | RUNWAY 33 TAILWIND | | | | |
|-------|--------------------------|--------|----------|-------------|-------------|--------------------------|--------|----------|-------------|-------------|
| | CRITICAL LIMITS IN KNOTS | | | | | CRITICAL LIMITS IN KNOTS | | | | |
| | 1 TO 4 | 5 TO 9 | 10 ABOVE | PERCENTAGES | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 ABOVE | PERCENTAGES | PERCENTAGES |
| 00-02 | 3.80 | 3.34 | 1.11 | 1527 | 19.78 | 32.48 | 29.99 | | | |
| 03-05 | 4.32 | 3.71 | 1.57 | 1527 | 24.36 | 28.95 | 28.79 | | | |
| 06-08 | 5.04 | 3.86 | 1.70 | 1527 | 24.43 | 26.06 | 29.47 | | | |
| 09-11 | 1.77 | 5.30 | 3.67 | 1527 | 9.30 | 20.43 | 51.02 | | | |
| 12-14 | .13 | 7.73 | 3.86 | 1527 | 3.27 | 15.19 | 65.62 | | | |
| 15-17 | .13 | 2.62 | 4.52 | 1527 | 2.29 | 23.71 | 58.48 | | | |
| 18-20 | 2.10 | 3.93 | 2.62 | 1527 | 16.83 | 29.67 | 35.49 | | | |
| 21-23 | 3.34 | 2.64 | 1.38 | 1526 | 20.05 | 28.37 | 34.27 | | | |
| 00-23 | 2.58 | 3.56 | 2.55 | 12215 | 15.04 | 25.61 | 41.56 | | | |

TABLE 2.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF FEB. | | NUMBER OBS. 509 | |
|--------------------------|--------|--------------------------|----------|--------------------------|----------|--------------------------|------------|
| HOUR 0 | | HOUR 1 | | HOUR 2 | | HOUR 3 | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| 1 TO 4 | 1.77 | 1.38 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .08 | 1.96 | .59 | .08 | .00 | .00 | .00 |
| 10- UP | .00 | .00 | .20 | .39 | .20 | .00 | .00 |
| TOTAL | 1.77 | 3.34 | .79 | .98 | .20 | .00 | .00 |
| RUNWAY 15 | | RUNWAY 33 | | RUNWAY 15 | | RUNWAY 33 | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | |
| 1 TO 4 | | 1 TO 4 | | 1 TO 4 | | 1 TO 4 | |
| 5 TO 9 | | 5 TO 9 | | 5 TO 9 | | 5 TO 9 | |
| 10 TO 14 | | 10 TO 14 | | 10 TO 14 | | 10 TO 14 | |
| 15 TO 19 | | 15 TO 19 | | 15 TO 19 | | 15 TO 19 | |
| 20 TO 24 | | 20 TO 24 | | 20 TO 24 | | 20 TO 24 | |
| 25- UP | | 25- UP | | 25- UP | | 25- UP | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 1.77 | | 13.36 | | 2.95 | | 1.18 | |
| .08 | | 31.63 | | .59 | | .00 | |
| .00 | | 1.57 | | 24.75 | | 3.93 | |
| 1.77 | | 46.56 | | 28.29 | | 5.11 | |
| TOTAL | | 7.07 | | 28.29 | | 5.11 | |
| TOTAL | | 19.25 | | 33.60 | | 30.65 | |
| TOTAL | | 2.36 | | 83.50 | | 83.50 | |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF FEB. | | NUMBER OBS. 509 | |
|--------------------------|--------|--------------------------|----------|--------------------------|----------|--------------------------|------------|
| HOUR 1 | | HOUR 2 | | HOUR 3 | | HOUR 4 | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| 1 TO 4 | 2.16 | 1.77 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | 1.96 | 1.57 | .20 | .00 | .00 | .00 |
| 10- UP | .00 | .00 | .39 | .59 | .39 | .00 | .00 |
| TOTAL | 2.16 | 3.73 | 1.96 | .79 | .39 | .00 | .00 |
| RUNWAY 15 | | RUNWAY 33 | | RUNWAY 15 | | RUNWAY 33 | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | |
| 1 TO 4 | | 1 TO 4 | | 1 TO 4 | | 1 TO 4 | |
| 5 TO 9 | | 5 TO 9 | | 5 TO 9 | | 5 TO 9 | |
| 10 TO 14 | | 10 TO 14 | | 10 TO 14 | | 10 TO 14 | |
| 15 TO 19 | | 15 TO 19 | | 15 TO 19 | | 15 TO 19 | |
| 20 TO 24 | | 20 TO 24 | | 20 TO 24 | | 20 TO 24 | |
| 25- UP | | 25- UP | | 25- UP | | 25- UP | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 2.16 | | 14.73 | | 1.96 | | 1.18 | |
| .00 | | 29.47 | | .79 | | .39 | |
| .00 | | 1.38 | | 24.17 | | 3.54 | |
| 2.16 | | 45.19 | | 26.92 | | 5.11 | |
| TOTAL | | 9.04 | | 26.92 | | 5.11 | |
| TOTAL | | 19.80 | | 32.42 | | 29.08 | |
| TOTAL | | 1.96 | | 81.34 | | 81.34 | |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF FEB. | | NUMBER OBS. 509 | |
|--------------------------|--------|--------------------------|----------|--------------------------|----------|--------------------------|------------|
| HOUR 2 | | HOUR 3 | | HOUR 4 | | HOUR 5 | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| 1 TO 4 | 2.95 | 1.38 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | 1.77 | .59 | .08 | .00 | .00 | .00 |
| 10- UP | .00 | .00 | .20 | .39 | .20 | .00 | .00 |
| TOTAL | 2.95 | 3.14 | 1.18 | .79 | .39 | .00 | .00 |
| RUNWAY 15 | | RUNWAY 33 | | RUNWAY 15 | | RUNWAY 33 | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | |
| 1 TO 4 | | 1 TO 4 | | 1 TO 4 | | 1 TO 4 | |
| 5 TO 9 | | 5 TO 9 | | 5 TO 9 | | 5 TO 9 | |
| 10 TO 14 | | 10 TO 14 | | 10 TO 14 | | 10 TO 14 | |
| 15 TO 19 | | 15 TO 19 | | 15 TO 19 | | 15 TO 19 | |
| 20 TO 24 | | 20 TO 24 | | 20 TO 24 | | 20 TO 24 | |
| 25- UP | | 25- UP | | 25- UP | | 25- UP | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 2.95 | | 13.95 | | 2.95 | | .59 | |
| .00 | | 20.00 | | .00 | | .00 | |
| .00 | | 1.18 | | 25.93 | | 3.93 | |
| 2.95 | | 43.03 | | 28.08 | | 5.30 | |
| TOTAL | | 8.64 | | 28.08 | | 5.30 | |
| TOTAL | | 20.24 | | 31.43 | | 30.26 | |
| TOTAL | | 1.38 | | 81.93 | | 81.93 | |

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TABLE 2.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|-----------------|-------------|--------|--------|----------|----------------|-------|-------------------------|-----------|----------|--------|-------------|-----------------|-----------|----------|----------|----------|----------------|------------|-------------------------|--------|-------------|--------|--------|-----------------|----------|-----------|--------|-------------|--|--|
| MONTH OF FEB. | | HOUR 6 | | | | | NUMBER OPS. 509 | | | | | MONTH OF FEB. | | HOUR 7 | | | | | NUMBER OPS. 509 | | | | | MONTH OF FEB. | | HOUR 8 | | | | | NUMBER OPS. 509 | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | | ZERO CROSS | TOTAL | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | | ZERO CROSS | TOTAL | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | | | | 15 TO 19 | 20 TO 24 | 25- UP | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | | | | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | PERCENTAGES | | |
| 1 TO 4 | 1.96 | 4.55 | .07 | .00 | .00 | .00 | 1.96 | 4.55 | 17.49 | 3.73 | 1.18 | 1.57 | .79 | .20 | .79 | 25.78 | 1.96 | 4.55 | .07 | .00 | .00 | .00 | .00 | 1.96 | 4.55 | 17.49 | 3.73 | 1.18 | 1.57 | .79 | .20 | .79 | 25.78 | | | | |
| 5 TO 9 | .00 | .79 | 1.33 | .56 | .20 | .00 | .00 | .79 | 25.34 | .59 | .59 | .00 | .00 | .00 | .59 | 27.50 | .00 | .79 | 1.33 | .56 | .20 | .00 | .00 | .00 | .79 | 25.34 | .59 | .59 | .00 | .00 | .59 | 27.50 | | | | | |
| 10- UP | .00 | .00 | 1.38 | .20 | .00 | .00 | .00 | .00 | 1.38 | 22.59 | 2.95 | .00 | .20 | .00 | .20 | 27.31 | .00 | .00 | 1.38 | .20 | .00 | .00 | .00 | .00 | .00 | 1.38 | 22.59 | 2.95 | .00 | .20 | .20 | 27.31 | | | | | |
| TOTAL | 1.96 | 3.34 | 3.14 | .79 | .20 | .00 | 1.96 | 9.43 | 44.01 | 27.31 | 4.72 | 1.77 | .99 | .20 | 1.57 | 80.55 | 1.96 | 3.34 | 3.14 | .79 | .20 | .00 | .00 | 1.96 | 9.43 | 44.01 | 27.31 | 4.72 | 1.77 | .99 | .20 | 1.57 | 80.55 | | | | |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|-----------------|-------------|--------|--------|----------|----------------|-------|-------------------------|-----------|----------|--------|-------------|-----------------|-----------|----------|----------|----------|----------------|------------|-------------------------|--------|-------------|--------|--------|-----------------|----------|-----------|--------|-------------|--|--|
| MONTH OF FEB. | | HOUR 6 | | | | | NUMBER OPS. 509 | | | | | MONTH OF FEB. | | HOUR 7 | | | | | NUMBER OPS. 509 | | | | | MONTH OF FEB. | | HOUR 8 | | | | | NUMBER OPS. 509 | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | | ZERO CROSS | TOTAL | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | | ZERO CROSS | TOTAL | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | | | | 15 TO 19 | 20 TO 24 | 25- UP | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | | | | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | PERCENTAGES | | |
| 1 TO 4 | 3.14 | 1.57 | .00 | .00 | .00 | .00 | 3.14 | 1.57 | 15.17 | 5.70 | 1.96 | 1.18 | .39 | .00 | .39 | 26.13 | 3.14 | 1.57 | .00 | .00 | .00 | .00 | 3.14 | 1.57 | 15.17 | 5.70 | 1.96 | 1.18 | .39 | .00 | .39 | 26.13 | | | | | |
| 5 TO 9 | .00 | 1.38 | .98 | .39 | .00 | .00 | .00 | 1.38 | 25.34 | .79 | .39 | .00 | .00 | .00 | .79 | 27.70 | .00 | .00 | 1.38 | .98 | .39 | .00 | .00 | .00 | .00 | .00 | 1.38 | 25.34 | .79 | .39 | .00 | .79 | 27.70 | | | | |
| 10- UP | .00 | .00 | 1.18 | .39 | .20 | .00 | .00 | .00 | 1.18 | 27.18 | 2.16 | .20 | .20 | .00 | .20 | 26.92 | .00 | .00 | .00 | 1.18 | .39 | .20 | .00 | .00 | .00 | .00 | 1.18 | 27.18 | 2.16 | .20 | .20 | .20 | 26.92 | | | | |
| TOTAL | 3.14 | 2.95 | 2.16 | 1.38 | .20 | .00 | 3.14 | 10.72 | 41.65 | 29.67 | 4.52 | 1.38 | .59 | .20 | 1.57 | 80.75 | 3.14 | 2.95 | 2.16 | 1.38 | .20 | .00 | .00 | 3.14 | 10.72 | 41.65 | 29.67 | 4.52 | 1.38 | .59 | .20 | 1.57 | 80.75 | | | | |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|-----------------|-------------|--------|--------|----------|----------------|-------|-------------------------|-----------|----------|--------|-------------|-----------------|-----------|----------|----------|----------|----------------|------------|-------------------------|--------|-------------|--------|--------|-----------------|----------|-----------|--------|-------------|--|--|
| MONTH OF FEB. | | HOUR 6 | | | | | NUMBER OPS. 509 | | | | | MONTH OF FEB. | | HOUR 7 | | | | | NUMBER OPS. 509 | | | | | MONTH OF FEB. | | HOUR 8 | | | | | NUMBER OPS. 509 | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | | ZERO CROSS | TOTAL | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | | ZERO CROSS | TOTAL | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | | | | 15 TO 19 | 20 TO 24 | 25- UP | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | | | | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | PERCENTAGES | | |
| 1 TO 4 | 3.73 | 1.96 | .00 | .00 | .00 | .00 | 3.73 | 1.96 | 13.54 | 3.14 | 1.38 | .20 | 1.57 | .20 | 1.57 | 21.91 | 3.73 | 1.96 | .00 | .00 | .00 | .00 | 3.73 | 1.96 | 13.54 | 3.14 | 1.38 | .20 | 1.57 | .20 | 1.57 | 21.91 | | | | | |
| 5 TO 9 | .00 | 1.18 | 2.95 | .39 | .00 | .00 | .00 | 1.18 | 20.63 | .98 | .39 | .00 | .00 | .00 | .39 | 22.99 | .00 | .00 | 1.18 | 2.95 | .39 | .00 | .00 | .00 | .00 | .00 | .00 | 1.18 | 20.63 | .98 | .39 | .00 | .39 | 22.99 | | | |
| 10- UP | .00 | .00 | .79 | .39 | .20 | .00 | .00 | .00 | 1.18 | 29.27 | 3.54 | .00 | .00 | .00 | .00 | 34.18 | .00 | .00 | .00 | .79 | .39 | .20 | .00 | .00 | .00 | .00 | .00 | .00 | .79 | .39 | .20 | .00 | .39 | 34.18 | | | |
| TOTAL | 3.73 | 3.14 | 3.73 | .98 | .20 | .00 | 3.73 | 12.38 | 35.35 | 33.00 | 5.30 | .20 | 1.57 | .20 | 1.57 | 78.59 | 3.73 | 3.14 | 3.73 | .98 | .20 | .00 | .00 | 3.73 | 12.38 | 35.35 | 33.00 | 5.30 | .20 | 1.57 | .20 | 1.57 | 78.59 | | | | |

TABLE 2.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF FEB. | | NUMBER OBS. 509 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | | PERCENTAGES | | ZERO CROSS | | TOTAL | | | | |
|----------------|------------|-------------------------|--------|---------------|--------|-----------------|--------|-----------|--------|----------------------|--------|---|--------|-------------|--------|------------|--------|--------|--------|------------|-------|-------|
| HOUR 9 | ZERO CROSS | 1 TO 5 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | 1 TO 5 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | 1 TO 5 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | ZERO CROSS | TOTAL | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.38 | 1.96 | 2.95 | 4.98 | 1.38 | .98 | .00 | .00 | .00 | .00 | .00 | .00 | .20 | .20 | 12.18 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.96 | 2.95 | 4.98 | 1.38 | .98 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .39 | 23.18 |
| 10- 1P | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.77 | 2.95 | 4.98 | 1.38 | .98 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .20 | 44.60 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.73 | 1.96 | 2.95 | 4.98 | 1.38 | .98 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .79 | 79.96 |
| KSC PEAK WINDS | | | | | | | | | | | | | | | | | | | | | | |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF FEB. | | NUMBER OBS. 509 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | | PERCENTAGES | | ZERO CROSS | | TOTAL | | | | |
| HOUR 10 | ZERO CROSS | 1 TO 5 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | 1 TO 5 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | 1 TO 5 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | ZERO CROSS | TOTAL | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.57 | 1.57 | 2.36 | 1.38 | 1.96 | 1.18 | .79 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 9.23 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.57 | 1.57 | 2.36 | 1.38 | 1.96 | 1.18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .20 | 10.27 |
| 10- 1P | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.96 | 1.57 | 2.36 | 1.38 | 1.96 | 1.18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .20 | 32.46 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.93 | 3.93 | 4.45 | 4.45 | 4.98 | 2.36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .39 | 79.96 |
| KSC PEAK WINDS | | | | | | | | | | | | | | | | | | | | | | |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF FEB. | | NUMBER OBS. 509 | | RUNWAY 15 | | CROSSWIND LIMITS *** | | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | | PERCENTAGES | | ZERO CROSS | | TOTAL | | | | |
| HOUR 11 | ZERO CROSS | 1 TO 5 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | 1 TO 5 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | 1 TO 5 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | ZERO CROSS | TOTAL | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.57 | 1.57 | 2.36 | 1.38 | 1.96 | 1.18 | .39 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 6.48 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.57 | 1.57 | 2.36 | 1.38 | 1.96 | 1.18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .79 | 19.84 |
| 10- 1P | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.77 | 1.57 | 2.36 | 1.38 | 1.96 | 1.18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .20 | 55.99 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.54 | 3.54 | 4.45 | 4.45 | 4.98 | 2.36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .98 | 82.32 |

TABLE 2.3. (Continued)

KSC PEAK WINDS TAILWINDS VS CROSSWINDS MONTH OF FEB.

| TAILWIND LIMITS | HOUR 18 | | HOUR 19 | | HOUR 20 | | HOUR 21 | | HOUR 22 | | HOUR 23 | | HOUR 24 | | HOUR 25 | | TOTAL | | | | |
|-----------------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|--------|--------|-----|-------|-------|
| | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | | | |
| 1 TO 4 | .59 | .79 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .59 | 10.81 | |
| 5 TO 9 | .00 | 1.57 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .34 | 32.22 | |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 39.10 |
| TOTAL | .59 | 2.36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .98 | 82.12 | |

PSC PEAK WINDS TAILWINDS VS CROSSWINDS MONTH OF FEB.

| TAILWIND LIMITS | HOUR 18 | | HOUR 19 | | HOUR 20 | | HOUR 21 | | HOUR 22 | | HOUR 23 | | HOUR 24 | | HOUR 25 | | TOTAL | | | | |
|-----------------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|--------|--------|------|-------|-------|
| | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | | | |
| 1 TO 4 | .98 | .79 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.18 | 19.45 | |
| 5 TO 9 | .00 | 2.36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .39 | 28.68 | |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 39.18 |
| TOTAL | .98 | 3.15 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.57 | 82.32 | |

KSC PEAK WINDS TAILWINDS VS CROSSWINDS MONTH OF FEB.

| TAILWIND LIMITS | HOUR 18 | | HOUR 19 | | HOUR 20 | | HOUR 21 | | HOUR 22 | | HOUR 23 | | HOUR 24 | | HOUR 25 | | TOTAL | | | | |
|-----------------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|--------|--------|------|-------|-------|
| | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | | | |
| 1 TO 4 | 1.18 | 1.95 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.38 | 20.24 | |
| 5 TO 9 | .00 | 1.96 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .98 | 28.09 | |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 33.20 |
| TOTAL | 1.18 | 3.93 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.36 | 81.53 | |

TABLE 2.3. (Concluded)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF FEB. | | NUMBER OBS. | | 509 | |
|-----------------|-------|-------------------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|
| HOUR 21 | | HOUR 22 | | HOUR 23 | | HOUR 24 | | HOUR 25 | |
| TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | |
| 1 TO 4 | | 1 TO 4 | | 1 TO 4 | | 1 TO 4 | | 1 TO 4 | |
| 5 TO 9 | | 5 TO 9 | | 5 TO 9 | | 5 TO 9 | | 5 TO 9 | |
| 10 TO 14 | | 10 TO 14 | | 10 TO 14 | | 10 TO 14 | | 10 TO 14 | |
| 15 TO 19 | | 15 TO 19 | | 15 TO 19 | | 15 TO 19 | | 15 TO 19 | |
| 20 TO 24 | | 20 TO 24 | | 20 TO 24 | | 20 TO 24 | | 20 TO 24 | |
| 25-UP | | 25-UP | | 25-UP | | 25-UP | | 25-UP | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| CROSSING LIMITS | | CROSSING LIMITS | | CROSSING LIMITS | | CROSSING LIMITS | | CROSSING LIMITS | |
| 1 TO 4 | | 1 TO 4 | | 1 TO 4 | | 1 TO 4 | | 1 TO 4 | |
| 5 TO 9 | | 5 TO 9 | | 5 TO 9 | | 5 TO 9 | | 5 TO 9 | |
| 10 TO 14 | | 10 TO 14 | | 10 TO 14 | | 10 TO 14 | | 10 TO 14 | |
| 15 TO 19 | | 15 TO 19 | | 15 TO 19 | | 15 TO 19 | | 15 TO 19 | |
| 20 TO 24 | | 20 TO 24 | | 20 TO 24 | | 20 TO 24 | | 20 TO 24 | |
| 25-UP | | 25-UP | | 25-UP | | 25-UP | | 25-UP | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1.96 | .98 | 1.57 | 1.18 | 1.57 | 1.18 | 1.57 | 1.18 | 1.57 | 1.18 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 1.96 | 2.55 | 2.55 | .98 | 2.55 | .98 | 2.55 | .98 | 2.55 | .98 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 2.95 | 15.91 | 1.38 | 1.18 | 2.95 | 15.91 | 1.38 | 1.18 | 2.95 | 15.91 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 2.95 | 28.36 | .20 | .00 | 2.95 | 28.36 | .20 | .00 | 2.95 | 28.36 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 8.06 | 41.06 | 31.43 | 5.11 | 8.06 | 41.06 | 31.43 | 5.11 | 8.06 | 41.06 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 1.38 | 21.02 | 1.38 | 21.02 | 1.38 | 21.02 | 1.38 | 21.02 | 1.38 | 21.02 |
| 1.38 | 25.93 | 1.38 | 25.93 | 1.38 | 25.93 | 1.38 | 25.93 | 1.38 | 25.93 |
| .20 | 34.97 | .20 | 34.97 | .20 | 34.97 | .20 | 34.97 | .20 | 34.97 |
| 2.95 | 81.93 | 2.95 | 81.93 | 2.95 | 81.93 | 2.95 | 81.93 | 2.95 | 81.93 |

TABLE 2.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY COMPONENT CLASS | RSC PERCENTAGES | | | | HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF FEB. | | | | |
|------------------------|-----------------|-----------------|-----------------|-----------------|--|-----------------|-----------------|-----------------|-----------------|
| | HOURS 06-04 CDF | HOURS 09-11 CDF | HOURS 12-16 CDF | HOURS 15-17 CDF | HOURS 06-17 CDF | HOURS 09-11 CDF | HOURS 12-16 CDF | HOURS 15-17 CDF | HOURS 06-17 CDF |
| 1-1 | 16.12 | 11.74 | 9.16 | 9.25 | 11.53 | 44.22 | 51.94 | 53.14 | 66.70 |
| 1-2 | 20.81 | 15.70 | 11.16 | 12.42 | 14.92 | 46.56 | 51.84 | 53.16 | 58.19 |
| 1-3 | 23.96 | 17.39 | 11.84 | 10.59 | 15.87 | 46.67 | 51.84 | 53.16 | 58.11 |
| 1-4 | 31.94 | 19.06 | 11.92 | 10.81 | 18.31 | 47.65 | 51.95 | 54.01 | 58.63 |
| 1-5 | 37.08 | 19.96 | 12.42 | 11.37 | 20.26 | 47.22 | 53.40 | 57.20 | 64.63 |
| 1-6 | 46.15 | 23.33 | 14.05 | 14.12 | 24.24 | 47.74 | 57.20 | 62.78 | 70.83 |
| 1-7 | 51.16 | 27.27 | 15.05 | 16.31 | 27.25 | 48.99 | 61.32 | 67.38 | 76.11 |
| 1-8 | 56.04 | 31.11 | 17.39 | 20.34 | 31.01 | 49.52 | 64.81 | 70.83 | 80.56 |
| 1-9 | 58.90 | 35.07 | 20.72 | 24.74 | 34.67 | 50.52 | 71.19 | 76.11 | 83.98 |
| 1-10 | 67.03 | 42.87 | 28.89 | 30.99 | 43.74 | 51.50 | 75.77 | 80.56 | 88.11 |
| 1-11 | 71.36 | 48.13 | 34.67 | 43.01 | 49.11 | 53.14 | 80.25 | 83.98 | 91.98 |
| 1-12 | 75.46 | 53.04 | 40.24 | 48.23 | 54.08 | 54.37 | 83.13 | 87.22 | 96.20 |
| 1-13 | 79.71 | 58.94 | 48.97 | 57.04 | 61.01 | 55.75 | 85.19 | 91.01 | 98.81 |
| 1-14 | 81.76 | 63.02 | 54.35 | 61.33 | 64.99 | 57.06 | 91.57 | 96.51 | 100.00 |
| 1-15 | 84.91 | 68.16 | 61.39 | 65.68 | 69.93 | 58.04 | 92.86 | 98.81 | 100.00 |
| 1-16 | 87.16 | 73.07 | 68.93 | 69.14 | 73.98 | 59.56 | 93.03 | 98.81 | 100.00 |
| 1-17 | 89.16 | 77.87 | 71.66 | 71.94 | 77.94 | 59.35 | 95.47 | 98.81 | 100.00 |
| 1-18 | 91.06 | 80.56 | 75.80 | 77.97 | 81.13 | 59.67 | 96.30 | 98.81 | 100.00 |
| 1-19 | 92.67 | 85.55 | 80.20 | 81.85 | 85.00 | 59.67 | 98.64 | 98.81 | 100.00 |
| 1-20 | 95.88 | 90.46 | 85.73 | 87.64 | 89.83 | 100.00 | 99.37 | 98.81 | 100.00 |
| 1-21 | 96.19 | 92.30 | 88.15 | 90.12 | 91.66 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-22 | 97.36 | 94.82 | 91.13 | 92.66 | 93.86 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-23 | 97.87 | 95.23 | 92.62 | 94.28 | 94.96 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-24 | 98.24 | 96.18 | 94.32 | 95.69 | 96.09 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-25 | 98.53 | 96.98 | 95.67 | 96.82 | 96.85 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-26 | 98.90 | 97.29 | 96.81 | 97.67 | 97.66 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-27 | 99.17 | 97.87 | 97.23 | 98.02 | 98.06 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-28 | 99.34 | 98.24 | 97.87 | 98.59 | 98.51 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-29 | 99.49 | 98.39 | 98.37 | 98.80 | 98.76 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-30 | 99.71 | 98.83 | 98.86 | 99.15 | 99.14 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-31 | 99.93 | 99.05 | 99.08 | 99.16 | 99.35 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-32 | 99.93 | 99.12 | 99.22 | 99.44 | 99.42 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-33 | 99.93 | 99.27 | 99.36 | 99.54 | 99.53 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-34 | 100.00 | 99.36 | 99.50 | 99.54 | 99.60 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-35 | 100.00 | 99.49 | 99.57 | 99.86 | 99.71 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-36 | 100.00 | 99.63 | 99.57 | 100.00 | 99.80 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-37 | 100.00 | 99.93 | 99.72 | 100.00 | 99.91 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-38 | 100.00 | 99.93 | 99.79 | 100.00 | 99.93 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-39 | 100.00 | 99.93 | 100.00 | 100.00 | 99.98 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-40 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-41 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-42 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-43 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-44 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 99.66 | 98.81 | 100.00 |
| 1-45 | 1365 | 1363 | 1409 | 1416 | 5953 | 396 | 243 | 237 | 1080 |

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TABLE 3.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| RUNWAY | 15 - 33 | KSC PEAK WINDS MONTH OF MARCH | | | | | TOTAL NUMBER OBS. | | |
|--------|---------|-------------------------------|--------------------------------------|----------|----------|----------|-------------------|----------------|-------------------|
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | 25 ABOVE | |
| HR | | | CROSSWIND PERCENTAGES | | | | | ZERO CROSSWIND | TOTAL NUMBER OBS. |
| | | | ***** CRITICAL LIMITS IN KNOTS ***** | | | | | | |
| 00-02 | 50.73 | 35.99 | 2.02 | 3.8 | .25 | 4.74 | 1581 | | |
| 03-05 | 54.08 | 29.92 | 7.27 | 5.1 | .13 | 5.57 | 1581 | | |
| 06-08 | 45.41 | 37.44 | 9.22 | 1.14 | .06 | 4.81 | 1581 | | |
| 09-11 | 18.60 | 59.77 | 13.35 | 5.57 | .32 | 1.33 | 1581 | | |
| 12-14 | 10.69 | 66.03 | 16.87 | 4.05 | .76 | .51 | 1581 | | |
| 15-17 | 13.92 | 63.88 | 16.09 | 2.53 | .25 | .32 | 1581 | | |
| 18-20 | 39.60 | 49.27 | 8.22 | 1.01 | .00 | 1.71 | 1581 | | |
| 21-23 | 47.09 | 42.59 | 5.19 | .51 | .25 | 3.48 | 1581 | | |
| 00-23 | 35.01 | 48.11 | 1.38 | 2.67 | .25 | 2.81 | 12647 | | |

TABLE 3.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY | 15 | KSC PEAK WINDS MONTH OF MARCH | | | | | TOTAL NUMBER OBS. | | |
|--------|------|-------------------------------|--------------------------------------|----------|----------|----------|-------------------|--------------------------|-------------------|
| | | 1 TO 4 | 5 TO 9 | 10 ABOVE | 10 ABOVE | 10 ABOVE | | | |
| HR | | | TAILWIND PERCENTAGES | | | | | CRITICAL LIMITS IN KNOTS | TOTAL NUMBER OBS. |
| | | | ***** CRITICAL LIMITS IN KNOTS ***** | | | | | | |
| 00-02 | 1.83 | 1.90 | .70 | 1581 | 19.67 | 37.44 | 36.69 | | |
| 03-05 | 1.96 | 2.34 | .89 | 1581 | 24.41 | 38.52 | 29.92 | | |
| 06-08 | 3.35 | 2.47 | 1.52 | 1581 | 22.83 | 31.37 | 36.81 | | |
| 09-11 | 1.01 | 4.05 | 3.35 | 1581 | 3.86 | 17.71 | 69.39 | | |
| 12-14 | .06 | 1.52 | 2.91 | 1581 | 1.14 | 11.26 | 82.73 | | |
| 15-17 | .00 | 1.01 | 2.15 | 1581 | 1.90 | 15.37 | 79.38 | | |
| 18-20 | 1.39 | 1.90 | .95 | 1581 | 10.50 | 34.16 | 50.73 | | |
| 21-23 | 3.35 | 1.58 | .76 | 1580 | 15.95 | 34.37 | 42.91 | | |
| 00-23 | 1.62 | 2.10 | 1.65 | 12647 | 12.53 | 27.52 | 53.57 | | |

TABLE 3.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| TAILWIND LIMITS | MARCH | | | | MARCH | | | | MARCH | | | | MARCH | | | |
|-----------------|--------|--------|----------|----------|----------|--------|------------|-------|--------|--------|----------|----------|----------|--------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .38 | 1.14 | .00 | .00 | .00 | .00 | .00 | 1.52 | 14.80 | 1.52 | .19 | .57 | .38 | 1.52 | 19.54 | |
| 5 TO 9 | .00 | .57 | .19 | .00 | .00 | .00 | .00 | 1.52 | 31.88 | .95 | .95 | .38 | .00 | .00 | 35.10 | |
| 10- UP | .00 | .00 | .19 | .00 | .00 | .00 | .00 | .19 | 2.66 | 34.35 | 3.80 | .00 | .00 | .00 | 40.99 | |
| TOTAL | .38 | 1.71 | .38 | .19 | .19 | .00 | .00 | 3.23 | 49.34 | 36.81 | 4.93 | .95 | .38 | 2.66 | 95.64 | |

| TAILWIND LIMITS | MARCH | | | | MARCH | | | | MARCH | | | | MARCH | | | |
|-----------------|--------|--------|----------|----------|----------|--------|------------|-------|--------|--------|----------|----------|----------|--------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 1.33 | .57 | .00 | .00 | .00 | .00 | .00 | 1.90 | 14.23 | 2.28 | 1.14 | .14 | .00 | .00 | 1.90 | |
| 5 TO 9 | .00 | .95 | .19 | .00 | .00 | .00 | .00 | 1.71 | 32.64 | 1.71 | .95 | .19 | .00 | .00 | 1.14 | |
| 10- UP | .00 | .00 | .19 | .00 | .00 | .00 | .00 | 1.14 | 2.09 | 29.98 | 3.61 | .19 | .00 | .00 | .19 | |
| TOTAL | 1.33 | 1.52 | .38 | .19 | .19 | .00 | .00 | 4.74 | 48.96 | 33.97 | 5.69 | 1.52 | .19 | 3.23 | 93.55 | |

| TAILWIND LIMITS | MARCH | | | | MARCH | | | | MARCH | | | | MARCH | | | |
|-----------------|--------|--------|----------|----------|----------|--------|------------|-------|--------|--------|----------|----------|----------|--------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .76 | 1.33 | .00 | .00 | .00 | .00 | .00 | 2.09 | 13.28 | 1.90 | .76 | .95 | .19 | .00 | 1.71 | |
| 5 TO 9 | .00 | 1.14 | .19 | .00 | .00 | .00 | .00 | 2.47 | 36.43 | 1.90 | .57 | .38 | .00 | .00 | 1.71 | |
| 10- UP | .00 | .00 | .19 | .00 | .00 | .00 | .00 | .76 | 1.71 | 27.70 | 3.42 | .00 | .00 | .00 | .00 | |
| TOTAL | .76 | 2.47 | .38 | .19 | .19 | .00 | .00 | 5.31 | 51.42 | 31.50 | 4.74 | 1.33 | .19 | 3.04 | 92.22 | |

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TABLE 3.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
|-----------------|------|--------------------------|-----|------|-----|------|--------------------------|-------|------|------|-----|------|-------|
| MONTH OF MARCH | | NUMBER OBS. 527 | | | | | | | | | | | |
| HOUR 3 | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | |
| TAILWIND LIMITS | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | |
| 1 TO 4 | | 1 TO 9 | | | | | 1 TO 9 | | | | | | |
| 5 TO 9 | | 10 TO 14 | | | | | 10 TO 14 | | | | | | |
| 10- UP | | 20 TO 24 | | | | | 20 TO 24 | | | | | | |
| TOTAL | | PERCENTAGES | | | | | PERCENTAGES | | | | | | |
| 1 TO 4 | | 1 TO 4 | | | | | 1 TO 4 | | | | | | |
| 5 TO 9 | | 5 TO 9 | | | | | 5 TO 9 | | | | | | |
| 10- UP | | 25- UP | | | | | 25- UP | | | | | | |
| TOTAL | | ZERO CROSS | | | | | ZERO CROSS | | | | | | |
| 1 TO 4 | 1.33 | .36 | .00 | .00 | .00 | 1.71 | 14.80 | 3.23 | 1.14 | .57 | .19 | 1.90 | 22.39 |
| 5 TO 9 | .00 | .76 | .76 | .00 | .00 | 2.78 | 35.10 | 1.52 | .76 | .00 | .00 | 2.09 | 39.85 |
| 10- UP | .00 | .00 | .38 | .00 | .00 | 1.14 | .57 | 23.91 | 4.93 | .00 | .00 | .19 | 29.98 |
| TOTAL | 1.33 | 1.14 | .95 | 1.14 | .57 | 5.12 | 50.47 | 28.65 | 6.83 | 1.33 | .57 | 4.17 | 92.22 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
| MONTH OF MARCH | | NUMBER OBS. 527 | | | | | | | | | | | |
| HOUR 4 | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | |
| TAILWIND LIMITS | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | |
| 1 TO 4 | | 1 TO 9 | | | | | 1 TO 9 | | | | | | |
| 5 TO 9 | | 10 TO 14 | | | | | 10 TO 14 | | | | | | |
| 10- UP | | 20 TO 24 | | | | | 20 TO 24 | | | | | | |
| TOTAL | | PERCENTAGES | | | | | PERCENTAGES | | | | | | |
| 1 TO 4 | | 1 TO 4 | | | | | 1 TO 4 | | | | | | |
| 5 TO 9 | | 5 TO 9 | | | | | 5 TO 9 | | | | | | |
| 10- UP | | 25- UP | | | | | 25- UP | | | | | | |
| TOTAL | | ZERO CROSS | | | | | ZERO CROSS | | | | | | |
| 1 TO 4 | 1.52 | .76 | .00 | .00 | .00 | 2.28 | 16.89 | 3.04 | 1.52 | .95 | .00 | 2.28 | 24.86 |
| 5 TO 9 | .00 | 1.90 | .57 | .00 | .00 | 3.04 | 34.35 | 1.52 | .57 | .38 | .00 | .76 | 37.57 |
| 10- UP | .00 | .00 | .19 | .57 | .00 | .76 | 2.09 | 22.77 | 4.36 | .19 | .19 | .19 | 29.79 |
| TOTAL | 1.52 | 2.66 | .76 | 1.14 | .00 | 6.07 | 53.32 | 27.32 | 6.45 | 1.52 | .19 | 3.23 | 92.22 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
| MONTH OF MARCH | | NUMBER OBS. 527 | | | | | | | | | | | |
| HOUR 5 | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | |
| TAILWIND LIMITS | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | |
| 1 TO 4 | | 1 TO 9 | | | | | 1 TO 9 | | | | | | |
| 5 TO 9 | | 10 TO 14 | | | | | 10 TO 14 | | | | | | |
| 10- UP | | 20 TO 24 | | | | | 20 TO 24 | | | | | | |
| TOTAL | | PERCENTAGES | | | | | PERCENTAGES | | | | | | |
| 1 TO 4 | | 1 TO 4 | | | | | 1 TO 4 | | | | | | |
| 5 TO 9 | | 5 TO 9 | | | | | 5 TO 9 | | | | | | |
| 10- UP | | 25- UP | | | | | 25- UP | | | | | | |
| TOTAL | | ZERO CROSS | | | | | ZERO CROSS | | | | | | |
| 1 TO 4 | .95 | .95 | .00 | .00 | .00 | 1.90 | 18.41 | 3.04 | 1.71 | 1.52 | .19 | 1.14 | 26.00 |
| 5 TO 9 | .00 | .95 | .38 | .00 | .00 | 1.71 | 34.16 | 1.52 | .00 | .19 | .00 | 2.28 | 38.14 |
| 10- UP | .00 | .00 | .57 | .19 | .00 | .76 | 2.09 | 23.53 | 4.17 | .19 | .00 | .00 | 29.98 |
| TOTAL | .95 | 1.90 | .95 | .57 | .00 | 4.36 | 54.65 | 28.08 | 5.88 | 1.90 | .19 | 3.42 | 94.12 |

TABLE 3.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | |
|-----------------|------|--------------------------|-----|--------|-----|----------|--------------------------|----------|------|----------|-----|--------|-----|------------|-------|--------|--|
| MONTH OF MARCH | | MONTH OF MARCH | | | | | | | | | | | | | | | |
| HOUR 6 | | NUMBER OBS. 527 | | | | | | | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | |
| TAILWIND LIMITS | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | | |
| 1 TO 4 | | 1 TO 4 | | 5 TO 9 | | 10 TO 14 | | 15 TO 19 | | 20 TO 24 | | 25- UP | | ZERO CROSS | | TOTAL | |
| 1 TO 4 | | 1 TO 4 | | 5 TO 9 | | 10 TO 14 | | 15 TO 19 | | 20 TO 24 | | 25- UP | | ZERO CROSS | | TOTAL | |
| 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1 TO 4 | 2.28 | 1.33 | .00 | .00 | .19 | 3.90 | 18.60 | 5.31 | 1.33 | .95 | .38 | .00 | .00 | 1.14 | 27.70 | | |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | 2.20 | 20.00 | 1.52 | .19 | .00 | .00 | .00 | .00 | 2.47 | 33.21 | | |
| 10- UP | .00 | .00 | .38 | .00 | .00 | .95 | 1.71 | 23.53 | 4.74 | .19 | .00 | .00 | .00 | .38 | 30.55 | | |
| TOTAL | 2.28 | 2.09 | .38 | .00 | .19 | 7.02 | 49.31 | 30.36 | 6.26 | 1.33 | .38 | .00 | .00 | 3.90 | 91.46 | | |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | |
|-----------------|------|--------------------------|------|--------|-----|----------|--------------------------|----------|------|----------|-----|--------|-----|------------|-------|--------|--|
| MONTH OF MARCH | | MONTH OF MARCH | | | | | | | | | | | | | | | |
| HOUR 7 | | NUMBER OBS. 527 | | | | | | | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | |
| TAILWIND LIMITS | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | | |
| 1 TO 4 | | 1 TO 4 | | 5 TO 9 | | 10 TO 14 | | 15 TO 19 | | 20 TO 24 | | 25- UP | | ZERO CROSS | | TOTAL | |
| 1 TO 4 | | 1 TO 4 | | 5 TO 9 | | 10 TO 14 | | 15 TO 19 | | 20 TO 24 | | 25- UP | | ZERO CROSS | | TOTAL | |
| 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1 TO 4 | 1.52 | 1.90 | .00 | .00 | .00 | 3.42 | 15.94 | 9.36 | 1.14 | 1.33 | .57 | .00 | .00 | 2.47 | 25.81 | | |
| 5 TO 9 | .00 | 1.14 | .38 | .57 | .19 | 2.28 | 30.55 | .95 | .38 | .19 | .00 | .00 | .00 | .57 | 32.64 | | |
| 10- UP | .00 | .00 | .19 | .00 | .00 | 1.71 | 1.90 | 25.41 | 3.98 | .19 | .00 | .00 | .00 | .19 | 32.07 | | |
| TOTAL | 1.52 | 3.04 | 1.33 | 1.14 | .38 | 7.40 | 48.39 | 31.12 | 5.50 | 1.71 | .57 | .00 | .00 | 3.23 | 90.51 | | |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | |
|-----------------|-----|--------------------------|------|--------|-----|----------|--------------------------|----------|------|----------|------|--------|-----|------------|-------|--------|--|
| MONTH OF MARCH | | MONTH OF MARCH | | | | | | | | | | | | | | | |
| HOUR 8 | | NUMBER OBS. 527 | | | | | | | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | |
| TAILWIND LIMITS | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | | |
| 1 TO 4 | | 1 TO 4 | | 5 TO 9 | | 10 TO 14 | | 15 TO 19 | | 20 TO 24 | | 25- UP | | ZERO CROSS | | TOTAL | |
| 1 TO 4 | | 1 TO 4 | | 5 TO 9 | | 10 TO 14 | | 15 TO 19 | | 20 TO 24 | | 25- UP | | ZERO CROSS | | TOTAL | |
| 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | | 10- UP | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1 TO 4 | .76 | 2.09 | .00 | .00 | .00 | 2.85 | 7.02 | 1.33 | 3.04 | 1.14 | 1.33 | .19 | .00 | .95 | 14.99 | | |
| 5 TO 9 | .00 | .76 | .95 | 1.14 | .00 | 2.85 | 24.87 | 1.90 | .97 | .38 | .00 | .00 | .00 | .76 | 28.27 | | |
| 10- UP | .00 | .00 | .38 | .00 | .00 | 1.90 | 2.47 | 39.66 | 5.12 | .19 | .00 | .00 | .00 | .38 | 47.82 | | |
| TOTAL | .76 | 2.85 | 1.90 | 1.71 | .38 | 7.59 | 34.16 | 42.88 | 8.73 | 1.71 | 1.33 | .19 | .00 | 2.09 | 91.08 | | |

TABLE 3.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|------------------|--------|----------|----------|----------|------------|-------|--------|
| MONTH OF MARCH | | MONTH OF MARCH | | | | | | | | | | | | |
| HOUR 12 | | NUMBER OBS. 527 | | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | | ZERO CROSS | TOTAL | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | 25- UP |
| PERCENTAGES | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | CROSS | | |
| 1 TO 4 | .00 | .19 | .00 | .00 | .00 | .19 | .07 | .00 | .19 | .76 | .38 | .00 | .00 | 1.33 |
| 5 TO 9 | .00 | .19 | .19 | .76 | .00 | 1.14 | 11.95 | 1.14 | .19 | .38 | .00 | .00 | .00 | 13.66 |
| 10- UP | .00 | .00 | 1.90 | 1.52 | .19 | 3.80 | 2.28 | 61.86 | 13.28 | .95 | .38 | .57 | .00 | 79.32 |
| TOTAL | .00 | .38 | 2.09 | 2.28 | .19 | 5.12 | 14.23 | 63.00 | 13.66 | 2.09 | .76 | .57 | .00 | 94.31 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|------------------|--------|----------|----------|----------|------------|-------|--------|
| MONTH OF MARCH | | MONTH OF MARCH | | | | | | | | | | | | |
| HOUR 13 | | NUMBER OBS. 527 | | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | | ZERO CROSS | TOTAL | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | 25- UP |
| PERCENTAGES | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | CROSS | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .57 | .38 | .00 | .00 | .95 |
| 5 TO 9 | .00 | .38 | .19 | .76 | .00 | 1.33 | 0.16 | .95 | .76 | .38 | .00 | .00 | .19 | 10.44 |
| 10- UP | .00 | .00 | 1.52 | .95 | .38 | 3.04 | .95 | 65.28 | 15.18 | 1.52 | .00 | .95 | .19 | 84.06 |
| TOTAL | .00 | .38 | 1.71 | 1.71 | .38 | 4.36 | 9.11 | 66.22 | 15.94 | 2.97 | .38 | .95 | .38 | 95.45 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|------------------|--------|----------|----------|----------|------------|-------|--------|
| MONTH OF MARCH | | MONTH OF MARCH | | | | | | | | | | | | |
| HOUR 14 | | NUMBER OBS. 527 | | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | | ZERO CROSS | TOTAL | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | 25- UP |
| PERCENTAGES | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | CROSS | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .19 | .00 | .38 | .19 | .58 | .00 | .00 | 1.14 |
| 5 TO 9 | .00 | .57 | .19 | .76 | .00 | 2.00 | 6.03 | 1.71 | .00 | .57 | .57 | .00 | .00 | 9.60 |
| 10- UP | .00 | .00 | .76 | .95 | .19 | 1.90 | 1.71 | 65.84 | 15.75 | .57 | .57 | .38 | .00 | 84.82 |
| TOTAL | .00 | .57 | .95 | 2.28 | .19 | 3.90 | 8.73 | 67.55 | 16.13 | 1.33 | 1.52 | .38 | .00 | 95.64 |

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TABLE 3.3. (Continued)

| EFC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF MARCH | | NUMBER OBS. 527 | |
|-----------------|-------------|-------------------------|-------------|----------------|-------------|-----------------|-------------|
| MARCH 15 | | MARCH 16 | | MARCH 17 | | MARCH 18 | |
| SUMMARY 15 | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 |
| PERCENTAGES | 157019 | 157019 | 157019 | 157019 | 157019 | 157019 | 157019 |
| 1 TO 5 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .34 | .36 | .19 | .19 | .19 | .19 | .19 |
| TOTAL | .34 | .36 | .19 | .19 | .19 | .19 | .19 |
| SUMMARY 16 | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 |
| PERCENTAGES | 157019 | 157019 | 157019 | 157019 | 157019 | 157019 | 157019 |
| 1 TO 5 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .34 | .36 | .19 | .19 | .19 | .19 | .19 |
| TOTAL | .34 | .36 | .19 | .19 | .19 | .19 | .19 |
| SUMMARY 17 | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 |
| PERCENTAGES | 157019 | 157019 | 157019 | 157019 | 157019 | 157019 | 157019 |
| 1 TO 5 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .34 | .36 | .19 | .19 | .19 | .19 | .19 |
| TOTAL | .34 | .36 | .19 | .19 | .19 | .19 | .19 |
| SUMMARY 18 | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 |
| PERCENTAGES | 157019 | 157019 | 157019 | 157019 | 157019 | 157019 | 157019 |
| 1 TO 5 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .34 | .36 | .19 | .19 | .19 | .19 | .19 |
| TOTAL | .34 | .36 | .19 | .19 | .19 | .19 | .19 |

TABLE 3.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
|-----------------|--------|--------------------------|----------|----------|----------|--------|--------------------------|-------|--------|--------|----------|----------|----------|--------|------------|-------|
| MONTH OF MARCH | | NUMBER OBS. 527 | | | | | | | | | | | | | | |
| HOUR 18 | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .19 | .19 | .00 | .00 | .00 | .00 | .00 | .76 | .30 | .00 | .00 | .19 | .00 | .00 | .19 | 3.80 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.33 | 25.72 | 3.61 | .19 | .57 | .00 | .00 | .19 | 20.27 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .75 | .38 | 55.22 | 9.68 | .00 | .00 | .00 | .00 | 65.28 |
| TOTAL | .19 | .76 | .76 | .38 | .38 | .00 | .00 | 2.47 | 27.13 | 59.20 | 9.67 | .76 | .00 | .00 | .38 | 97.34 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
| MONTH OF MARCH | | NUMBER OBS. 527 | | | | | | | | | | | | | | |
| HOUR 19 | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .95 | .95 | .00 | .00 | .00 | .00 | .00 | 1.90 | 11.01 | .57 | .00 | .00 | .00 | .00 | .76 | 12.33 |
| 5 TO 9 | .00 | .95 | .38 | .57 | .00 | .00 | .00 | 1.90 | 33.40 | 3.23 | .19 | .19 | .00 | .00 | .19 | 37.19 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .95 | .19 | 39.47 | 5.50 | .00 | .00 | .00 | .00 | 45.16 |
| TOTAL | .95 | 1.90 | 1.14 | .76 | .00 | .00 | .00 | 4.74 | 44.59 | 43.26 | 5.69 | .19 | .00 | .00 | .95 | 94.69 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
| MONTH OF MARCH | | NUMBER OBS. 527 | | | | | | | | | | | | | | |
| HOUR 20 | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .95 | .95 | .00 | .00 | .00 | .00 | .00 | 1.90 | 12.33 | .76 | .57 | .19 | .00 | .00 | 1.52 | 15.37 |
| 5 TO 9 | .00 | 1.90 | .38 | .19 | .00 | .00 | .00 | 2.47 | 32.24 | 3.14 | .38 | .19 | .00 | .00 | 1.14 | 37.00 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.14 | .38 | 36.05 | 5.12 | .00 | .19 | .00 | .00 | 41.75 |
| TOTAL | .95 | 2.95 | 1.14 | .19 | .38 | .00 | .00 | 5.50 | 44.97 | 39.81 | 6.07 | .38 | .19 | .00 | 2.66 | 94.12 |

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TABLE 3.3. (Concluded)

| ASC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | NUMBER OBS. | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
|------------------------------|-------------------------|------------------------------|----------|------------------------------|----------|------------------------------|------------|------------------------------|---------|------------------------------|----------|------------------------------|----------|------------------------------|------------|
| MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| ASC PEAK WINDS | TAILWINDS VS CROSSWINDS | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 |
| MCUP 21 | MCUP 22 | MCUP 23 | MCUP 24 | MCUP 25 | MCUP 26 | MCUP 27 | MCUP 28 | MCUP 29 | MCUP 30 | MCUP 31 | MCUP 32 | MCUP 33 | MCUP 34 | MCUP 35 | MCUP 36 |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| 1 TO 4 | 1.00 | 1.95 | .00 | .00 | .00 | .00 | .00 | 2.95 | 11.95 | 1.71 | .38 | .19 | .19 | .00 | .57 |
| 5 TO 9 | .00 | 1.14 | .38 | .00 | .00 | .00 | .00 | 1.71 | 30.17 | 3.04 | .19 | .19 | .00 | .00 | .57 |
| 10-14 | .00 | .00 | .38 | .00 | .00 | .00 | .00 | .57 | 2.28 | 37.38 | 4.17 | .00 | .00 | .00 | .57 |
| TOTAL | 1.00 | 2.09 | .57 | .38 | .19 | .00 | .00 | 5.12 | 48.40 | 42.13 | 4.74 | .38 | .19 | .00 | 1.71 |
| CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | |
| 1 TO 4 | .95 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .38 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-14 | .00 | .00 | .38 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.00 | 2.09 | .57 | .38 | .19 | .00 | .00 | 5.12 | 48.40 | 42.13 | 4.74 | .38 | .19 | .00 | 1.71 |
| ASC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | NUMBER OBS. | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| ASC PEAK WINDS | TAILWINDS VS CROSSWINDS | NUMBER OBS. | 526 | NUMBER OBS. | 526 | NUMBER OBS. | 526 | NUMBER OBS. | 526 | NUMBER OBS. | 526 | NUMBER OBS. | 526 | NUMBER OBS. | 526 |
| MCUP 22 | MCUP 23 | MCUP 24 | MCUP 25 | MCUP 26 | MCUP 27 | MCUP 28 | MCUP 29 | MCUP 30 | MCUP 31 | MCUP 32 | MCUP 33 | MCUP 34 | MCUP 35 | MCUP 36 | MCUP 37 |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| 1 TO 4 | 2.29 | 1.90 | .00 | .00 | .00 | .00 | .00 | 4.19 | 12.17 | 1.33 | .19 | .19 | .00 | .19 | 1.33 |
| 5 TO 9 | .00 | .57 | .38 | .19 | .00 | .00 | .00 | 1.71 | 31.71 | 2.47 | .38 | .38 | .00 | .00 | .57 |
| 10-14 | .00 | .00 | .38 | .00 | .00 | .00 | .00 | .57 | 1.90 | 35.55 | 3.99 | .19 | .00 | .00 | .57 |
| TOTAL | 2.29 | 2.47 | .76 | .19 | .38 | .00 | .00 | 6.78 | 45.82 | 39.35 | 4.14 | .95 | .00 | .19 | 2.47 |
| CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | |
| 1 TO 4 | .90 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .38 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-14 | .00 | .00 | .38 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 2.29 | 2.47 | .76 | .19 | .38 | .00 | .00 | 6.78 | 45.82 | 39.35 | 4.14 | .95 | .00 | .19 | 2.47 |
| ASC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | NUMBER OBS. | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | | MARCH | |
| ASC PEAK WINDS | TAILWINDS VS CROSSWINDS | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 | NUMBER OBS. | 527 |
| MCUP 23 | MCUP 24 | MCUP 25 | MCUP 26 | MCUP 27 | MCUP 28 | MCUP 29 | MCUP 30 | MCUP 31 | MCUP 32 | MCUP 33 | MCUP 34 | MCUP 35 | MCUP 36 | MCUP 37 | MCUP 38 |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| 1 TO 4 | 2.09 | .95 | .00 | .00 | .00 | .00 | .00 | 3.04 | 13.47 | 1.71 | .19 | .19 | .00 | .19 | 1.33 |
| 5 TO 9 | .00 | .76 | .38 | .19 | .00 | .00 | .00 | 1.71 | 29.98 | 1.71 | .57 | .38 | .00 | .00 | 1.14 |
| 10-14 | .00 | .00 | .38 | .00 | .00 | .00 | .00 | 1.14 | 1.33 | 36.62 | 3.42 | .00 | .19 | .00 | .57 |
| TOTAL | 2.09 | 1.71 | 1.14 | .38 | .19 | .00 | .00 | 5.98 | 44.78 | 40.04 | 4.17 | .38 | .19 | .00 | 3.04 |
| CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | | CROSSWIND LIMITS PERCENTAGES | |
| 1 TO 4 | .95 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .38 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-14 | .00 | .00 | .38 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 2.09 | 1.71 | 1.14 | .38 | .19 | .00 | .00 | 5.98 | 44.78 | 40.04 | 4.17 | .38 | .19 | .00 | 3.04 |

TABLE 3.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| MPS | M5C PEAK WINDS | | | | HEADTAIL WIND REVERSALS | | | | MONTH OF MARCH | | | | | |
|-------|----------------------|----------------------|----------------------|----------------------|-------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | 15 000 | | 33 000 | | 15 000 | | 33 000 | | 15 000 | | 33 000 | | 3.4A | |
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 5.07 | 2.85 | 2.22 | 2.98 | 50.00 | 7.10 | 2.98 | 9.12 | 47.96 | 4.39 | | | | |
| 03-05 | 5.96 | 3.39 | 2.96 | 3.98 | 51.22 | 7.60 | 3.68 | 3.93 | 51.33 | 4.73 | | | | |
| 06-08 | 6.87 | 4.94 | 3.93 | 5.34 | 53.42 | 10.77 | 5.07 | 5.70 | 56.34 | 6.27 | | | | |
| 09-11 | 7.86 | 5.17 | 4.75 | 3.39 | 56.39 | 8.30 | 4.94 | 3.36 | 54.55 | 3.69 | | | | |
| 12-14 | 4.56 | 2.03 | 2.53 | 2.12 | 56.34 | 4.82 | 2.72 | 2.09 | 55.84 | 2.20 | | | | |
| 15-17 | 3.04 | 1.33 | 1.71 | 1.37 | 54.00 | 3.04 | 1.71 | 1.33 | 50.94 | 1.38 | | | | |
| 18-20 | 4.69 | 2.79 | 1.90 | 2.91 | 44.78 | 5.22 | 2.03 | 3.30 | 43.84 | 3.46 | | | | |
| 21-23 | 6.59 | 2.99 | 3.61 | 3.16 | 63.33 | 7.79 | 4.25 | 3.59 | 62.62 | 3.91 | | | | |
| 20-21 | 5.83 | 2.92 | 2.97 | 3.08 | 54.20 | 6.84 | 3.42 | 3.42 | 53.60 | 3.66 | | | | |

| MPS | M5C PEAK WINDS | | | | HEADWIND TO TAILWIND REVERSALS | | | | MONTH OF MARCH | | | | | |
|-------|----------------------|----------------------|----------------------|----------------------|--------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | 15 000 | | 33 000 | | 15 000 | | 33 000 | | 15 000 | | 33 000 | | 3.4B | |
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 1.33 | 1.67 | 1.66 | 2.98 | 22.45 | 15.33 | 15.33 | 10.20 | 15.33 | 16.81 | 16.81 | 10.20 | 15.33 | 16.81 |
| 03-05 | 1.67 | 1.67 | 1.67 | 3.48 | 18.58 | 15.93 | 15.93 | 16.81 | 15.93 | 16.81 | 16.81 | 16.81 | 15.93 | 16.81 |
| 06-08 | 1.67 | 1.67 | 1.67 | 5.34 | 14.79 | 15.93 | 15.93 | 26.86 | 15.93 | 26.86 | 26.86 | 26.86 | 15.93 | 26.86 |
| 09-11 | 1.52 | 1.52 | 1.52 | 3.39 | 5.59 | 6.29 | 6.29 | 42.66 | 6.29 | 42.66 | 42.66 | 42.66 | 6.29 | 42.66 |
| 12-14 | 1.27 | 1.27 | 1.27 | 2.12 | 6.49 | 1.30 | 1.30 | 48.05 | 1.30 | 48.05 | 48.05 | 48.05 | 1.30 | 48.05 |
| 15-17 | 1.46 | 1.46 | 1.46 | 1.37 | 3.77 | 3.77 | 3.77 | 43.40 | 3.77 | 43.40 | 43.40 | 43.40 | 3.77 | 43.40 |
| 18-20 | 1.26 | 1.26 | 1.26 | 2.91 | 12.33 | 15.07 | 15.07 | 16.44 | 15.07 | 16.44 | 16.44 | 16.44 | 15.07 | 16.44 |
| 21-23 | 1.21 | 1.21 | 1.21 | 3.16 | 27.10 | 19.63 | 19.63 | 15.89 | 19.63 | 15.89 | 15.89 | 15.89 | 19.63 | 15.89 |
| 00-21 | 1.24 | 1.24 | 1.05 | 3.98 | 14.52 | 12.24 | 12.24 | 26.80 | 12.24 | 26.80 | 26.80 | 26.80 | 12.24 | 26.80 |

TABLE 3.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF MARCH

| RUNWAY COMPONENT CLASS | MSE PEAK WINDS | | | | | 000 RUNWAY 15 000 | | | | | 000 RUNWAY 33 000 | | | | |
|------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|-----------------|-----------------|-----------------|-----------------|-------------------|-----------------|-----------------|-----------------|-----------------|
| | HOURS 06-00 C/P | HOURS 09-11 C/P | HOURS 12-14 C/P | HOURS 15-17 C/P | HOURS 19-21 C/P | HOURS 09-11 C/P | HOURS 12-14 C/P | HOURS 15-17 C/P | HOURS 19-21 C/P | HOURS 22-00 C/P | HOURS 09-11 C/P | HOURS 12-14 C/P | HOURS 15-17 C/P | HOURS 19-21 C/P | HOURS 22-00 C/P |
| 1-1 | 6.88 | 1.52 | .47 | .26 | 2.13 | 6.88 | 7.79 | 7.79 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-2 | 11.06 | 4.07 | 1.19 | .79 | 4.22 | 7.69 | 7.79 | 7.79 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-3 | 14.27 | 4.49 | 1.52 | 1.31 | 5.32 | 7.69 | 7.79 | 7.79 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-4 | 21.02 | 4.70 | 1.59 | 1.63 | 7.14 | 11.89 | 7.79 | 7.79 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-5 | 26.42 | 4.90 | 1.59 | 2.16 | 8.65 | 18.19 | 9.09 | 9.09 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-6 | 34.06 | 6.08 | 1.79 | 2.81 | 11.03 | 24.48 | 11.32 | 11.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-7 | 39.32 | 8.15 | 2.05 | 3.92 | 13.18 | 27.97 | 12.99 | 12.99 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-8 | 45.94 | 11.12 | 3.84 | 6.21 | 16.53 | 30.16 | 20.79 | 20.79 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-9 | 50.99 | 15.68 | 5.50 | 7.97 | 19.80 | 30.35 | 29.87 | 29.87 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-10 | 60.27 | 24.24 | 13.38 | 18.03 | 28.75 | 62.96 | 40.26 | 40.26 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-11 | 66.35 | 31.22 | 19.40 | 24.43 | 35.12 | 66.43 | 46.75 | 46.75 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-12 | 73.02 | 36.95 | 24.50 | 30.05 | 40.09 | 66.43 | 46.75 | 46.75 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-13 | 74.61 | 44.82 | 34.17 | 38.99 | 47.95 | 70.63 | 49.35 | 49.35 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-14 | 78.02 | 50.21 | 39.60 | 44.69 | 52.94 | 73.43 | 54.55 | 54.55 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-15 | 81.37 | 57.39 | 47.35 | 52.06 | 59.37 | 76.92 | 61.04 | 61.04 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-16 | 84.30 | 63.97 | 53.91 | 58.52 | 64.90 | 75.32 | 64.15 | 64.15 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-17 | 86.83 | 69.06 | 61.32 | 64.60 | 70.32 | 75.32 | 67.71 | 67.71 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-18 | 89.35 | 74.31 | 66.75 | 69.56 | 74.87 | 75.32 | 71.70 | 71.70 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-19 | 91.74 | 81.56 | 74.30 | 76.62 | 80.95 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-20 | 94.61 | 88.33 | 82.98 | 84.06 | 87.42 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-21 | 95.56 | 91.02 | 86.36 | 85.96 | 89.65 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-22 | 97.13 | 93.02 | 90.07 | 88.96 | 92.24 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-23 | 97.41 | 94.34 | 91.26 | 90.53 | 93.33 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-24 | 97.95 | 95.86 | 94.30 | 92.88 | 95.21 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-25 | 98.23 | 97.51 | 95.63 | 94.19 | 96.36 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-26 | 98.50 | 98.07 | 96.95 | 95.36 | 97.20 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-27 | 98.70 | 98.62 | 97.81 | 96.73 | 97.95 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-28 | 98.98 | 98.94 | 98.21 | 98.04 | 98.54 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-29 | 99.32 | 99.17 | 98.68 | 98.37 | 98.87 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-30 | 99.73 | 99.59 | 99.27 | 99.02 | 99.40 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-31 | 99.73 | 99.79 | 99.54 | 99.28 | 99.58 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-32 | 99.80 | 100.00 | 99.67 | 99.48 | 99.73 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-33 | 99.86 | 100.00 | 99.80 | 99.80 | 99.87 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-34 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-35 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-36 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-37 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-38 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-39 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-40 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-41 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 1-42 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 75.32 | 75.32 | 75.32 | 5.66 | 5.66 | 11.32 | 11.32 | 11.32 | 11.32 | 11.32 |
| 406c | 1465 | 1448 | 1510 | 1531 | 5958 | 143 | 77 | 53 | 815 | 815 | 815 | 815 | 815 | 815 | 815 |

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TABLE 4.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| HRS | MSC PEAK WINDS MONTH OF APRIL | | | | | | | | | | TOTAL NUMBER OPS. | | | |
|-------|--------------------------------------|-------|--------|------|----------|------|----------|------|----------|------|-------------------|------|----------------|-------|
| | CROSSWINDS | | | | | | | | | | | | | |
| | ***** CRITICAL LIMITS IN KNOTS ***** | | | | | | | | | | | | | |
| | 1 TO 4 | | 5 TO 9 | | 10 TO 14 | | 15 TO 19 | | 20 TO 24 | | 25 ABOVE | | ZERO CROSSWIND | |
| | PERCENTAGES | | | | | | | | | | | | | |
| 00-02 | 51.08 | 40.88 | 7.34 | 0.69 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 3.71 | 1617 |
| 03-05 | 55.66 | 33.83 | 4.51 | 1.24 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 4.33 | 1617 |
| 06-08 | 45.12 | 43.51 | 5.93 | 1.61 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 3.21 | 1618 |
| 09-11 | 19.14 | 63.27 | 12.28 | 3.52 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.56 | 1620 |
| 12-14 | 7.35 | 75.62 | 13.21 | 2.47 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.25 | 1620 |
| 15-17 | 13.49 | 74.20 | 12.72 | 1.67 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.37 | 1620 |
| 18-20 | 39.25 | 54.39 | 4.26 | 1.56 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 1.30 | 1614 |
| 21-23 | 48.73 | 42.61 | 4.33 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.77 | 1617 |
| 00-23 | 34.59 | 53.55 | 7.58 | 1.54 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 2.19 | 12947 |

TABLE 4.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| HRS | MSC PEAK WINDS MONTH OF APRIL | | | | | | | | | | TOTAL NUMBER OPS. |
|-------|--------------------------------------|------|--------|------|----------|------|----------|------|----------|------|-------------------|
| | TAILWINDS | | | | | | | | | | |
| | ***** CRITICAL LIMITS IN KNOTS ***** | | | | | | | | | | |
| | 1 TO 4 | | 5 TO 9 | | 10 ABOVE | | 10 ABOVE | | 10 ABOVE | | |
| | PERCENTAGES | | | | | | | | | | |
| 00-02 | 1.67 | 0.62 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 1617 |
| 03-05 | 2.78 | 1.11 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 1617 |
| 06-08 | 2.66 | 2.04 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 1618 |
| 09-11 | 0.49 | 2.28 | 2.72 | 2.72 | 2.72 | 2.72 | 2.72 | 2.72 | 2.72 | 2.72 | 1620 |
| 12-14 | 0.00 | 0.00 | 1.11 | 1.11 | 1.11 | 1.11 | 1.11 | 1.11 | 1.11 | 1.11 | 1620 |
| 15-17 | 0.00 | 0.43 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 1620 |
| 18-20 | 0.43 | 0.31 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 1618 |
| 21-23 | 1.30 | 1.11 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 1617 |
| 00-23 | 1.17 | 1.09 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 12947 |

TABLE 4.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| KSC PEAK WINDS | | | | | | | | | | TAILWINDS VS CROSSWINDS | | | | | | | | | |
|-----------------|------|--------|------|-----|------------------|------|--------|------|-----|-------------------------|------|--------|------|-----|------------------|------|--------|------|-----|
| MONTH OF APRIL | | | | | MONTH OF APRIL | | | | | MONTH OF APRIL | | | | | MONTH OF APRIL | | | | |
| HOUR | D | NUMBER | ORs. | 539 | HOUR | D | NUMBER | ORs. | 539 | HOUR | D | NUMBER | ORs. | 539 | HOUR | D | NUMBER | ORs. | 539 |
| RUNWAY 15 | | | | | | | | | | RUNWAY 33 | | | | | | | | | |
| TAILWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | TAILWIND LIMITS | | | | | CROSSWIND LIMITS | | | | |
| 1 TO 4 | 1.11 | .74 | .00 | .00 | 1 TO 4 | 1.11 | .74 | .00 | .00 | 1 TO 4 | 1.11 | .74 | .00 | .00 | 1 TO 4 | 1.11 | .74 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | 5 TO 9 | .00 | .00 | .00 | .00 | 5 TO 9 | .00 | .00 | .00 | .00 | 5 TO 9 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .00 | .00 | 10-UP | .00 | .00 | .00 | .00 | 10-UP | .00 | .00 | .00 | .00 | 10-UP | .00 | .00 | .00 | .00 |
| TOTAL | 1.11 | 1.33 | .19 | .19 | TOTAL | 1.11 | 1.33 | .19 | .19 | TOTAL | 1.11 | 1.33 | .19 | .19 | TOTAL | 1.11 | 1.33 | .19 | .19 |
| RUNWAY 15 | | | | | | | | | | RUNWAY 33 | | | | | | | | | |
| TAILWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | TAILWIND LIMITS | | | | | CROSSWIND LIMITS | | | | |
| 1 TO 4 | 1.11 | .93 | .00 | .00 | 1 TO 4 | 1.11 | .93 | .00 | .00 | 1 TO 4 | 1.11 | .93 | .00 | .00 | 1 TO 4 | 1.11 | .93 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | 5 TO 9 | .00 | .00 | .00 | .00 | 5 TO 9 | .00 | .00 | .00 | .00 | 5 TO 9 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .00 | .00 | 10-UP | .00 | .00 | .00 | .00 | 10-UP | .00 | .00 | .00 | .00 | 10-UP | .00 | .00 | .00 | .00 |
| TOTAL | 1.11 | 1.33 | .37 | .37 | TOTAL | 1.11 | 1.33 | .37 | .37 | TOTAL | 1.11 | 1.33 | .37 | .37 | TOTAL | 1.11 | 1.33 | .37 | .37 |
| RUNWAY 15 | | | | | | | | | | RUNWAY 33 | | | | | | | | | |
| TAILWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | TAILWIND LIMITS | | | | | CROSSWIND LIMITS | | | | |
| 1 TO 4 | .93 | .19 | .00 | .00 | 1 TO 4 | .93 | .19 | .00 | .00 | 1 TO 4 | .93 | .19 | .00 | .00 | 1 TO 4 | .93 | .19 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | 5 TO 9 | .00 | .00 | .00 | .00 | 5 TO 9 | .00 | .00 | .00 | .00 | 5 TO 9 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .00 | .00 | 10-UP | .00 | .00 | .00 | .00 | 10-UP | .00 | .00 | .00 | .00 | 10-UP | .00 | .00 | .00 | .00 |
| TOTAL | .93 | .19 | .56 | .56 | TOTAL | .93 | .19 | .56 | .56 | TOTAL | .93 | .19 | .56 | .56 | TOTAL | .93 | .19 | .56 | .56 |

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TABLE 4.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF APRIL | | NUMBER OPS. | | 539 | |
|------------------|------|-------------------------|------|------------------|------|------------------|-------|------------------|------|
| HOUR 3 | | HOUR 4 | | HOUR 5 | | HOUR 6 | | HOUR 7 | |
| RUNWAY 15 | | RUNWAY 33 | | RUNWAY 15 | | RUNWAY 33 | | RUNWAY 15 | |
| CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | |
| 25- UP | | 25- UP | | 25- UP | | 25- UP | | 25- UP | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1 TO 4 | .56 | .74 | .00 | .00 | 1.70 | 1.29 | 2.41 | 1.11 | .74 |
| 5 TO 8 | .00 | .37 | .00 | .00 | .00 | 37.20 | 2.22 | .74 | .00 |
| 9 TO 12 | .00 | .00 | .00 | .00 | .37 | 2.04 | 29.87 | 1.37 | .19 |
| 13 TO 16 | .56 | 1.11 | .74 | .00 | 2.60 | 53.67 | 34.51 | 3.14 | .93 |
| TOTAL | 1.12 | 1.11 | 0.74 | 0.00 | 4.27 | 87.10 | 66.65 | 6.16 | 1.77 |
| ZERO CROSS | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.12 | 1.11 | 0.74 | 0.00 | 4.27 | 87.10 | 66.65 | 6.16 | 1.77 |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF APRIL | | NUMBER OPS. | | 539 | |
|------------------|------|-------------------------|------|------------------|-------|------------------|-------|------------------|------|
| HOUR 3 | | HOUR 4 | | HOUR 5 | | HOUR 6 | | HOUR 7 | |
| RUNWAY 15 | | RUNWAY 33 | | RUNWAY 15 | | RUNWAY 33 | | RUNWAY 15 | |
| CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | |
| 25- UP | | 25- UP | | 25- UP | | 25- UP | | 25- UP | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1 TO 4 | 1.67 | 1.26 | .00 | .00 | 3.53 | 17.27 | 2.41 | .97 | .56 |
| 5 TO 8 | .00 | .56 | .00 | .00 | 1.11 | 34.37 | 2.24 | .19 | .00 |
| 9 TO 12 | .00 | .00 | .00 | .00 | .74 | 1.37 | 27.83 | 2.75 | .19 |
| 13 TO 16 | 1.67 | 2.41 | 1.11 | .19 | 5.16 | 52.68 | 32.28 | 3.97 | .93 |
| TOTAL | 3.34 | 4.23 | 1.11 | .19 | 10.54 | 103.02 | 64.69 | 7.88 | 1.74 |
| ZERO CROSS | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 3.34 | 4.23 | 1.11 | .19 | 10.54 | 103.02 | 64.69 | 7.88 | 1.74 |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF APRIL | | NUMBER OPS. | | 539 | |
|------------------|------|-------------------------|------|------------------|-------|------------------|-------|------------------|------|
| HOUR 3 | | HOUR 4 | | HOUR 5 | | HOUR 6 | | HOUR 7 | |
| RUNWAY 15 | | RUNWAY 33 | | RUNWAY 15 | | RUNWAY 33 | | RUNWAY 15 | |
| CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | |
| 25- UP | | 25- UP | | 25- UP | | 25- UP | | 25- UP | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1 TO 4 | 1.67 | 2.04 | .00 | .00 | 3.53 | 18.57 | 2.23 | .74 | .37 |
| 5 TO 8 | .00 | .37 | .00 | .00 | 1.70 | 76.73 | 1.30 | .37 | .00 |
| 9 TO 12 | .00 | .00 | .00 | .00 | .74 | 1.11 | 25.23 | 2.41 | .37 |
| 13 TO 16 | 1.67 | 2.41 | 1.11 | .37 | 5.74 | 56.77 | 28.76 | 3.53 | 1.11 |
| TOTAL | 3.34 | 4.82 | 1.11 | .37 | 11.77 | 143.37 | 34.74 | 7.88 | 2.14 |
| ZERO CROSS | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 3.34 | 4.82 | 1.11 | .37 | 11.77 | 143.37 | 34.74 | 7.88 | 2.14 |

TABLE 4.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | |
|-----------------|--------|------------------------------|--------|----------|----------|----------|------------------------------|------------|-------|--------|--------|----------|----------|----------|--------|------------|-------|-----|
| MONTH OF APRIL | | HOUR 6 | | | | | NUMBER OBS. 539 | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | |
| | | CROSSWIND LIMITS PERCENTAGES | | | | | CROSSWIND LIMITS PERCENTAGES | | | | | | | | | | | |
| 1 TO 4 | 1.67 | 1.67 | 1.67 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .74 | .37 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10- UP | .00 | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.67 | 2.41 | .56 | .37 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | |
|-----------------|--------|------------------------------|--------|----------|----------|----------|------------------------------|------------|-------|--------|--------|----------|----------|----------|--------|------------|-------|-----|
| MONTH OF APRIL | | HOUR 7 | | | | | NUMBER OBS. 539 | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | |
| | | CROSSWIND LIMITS PERCENTAGES | | | | | CROSSWIND LIMITS PERCENTAGES | | | | | | | | | | | |
| 1 TO 4 | 1.30 | 1.86 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .27 | 1.11 | .56 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10- UP | .00 | .00 | .56 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.30 | 2.23 | 1.67 | .74 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | |
|-----------------|--------|------------------------------|--------|----------|----------|----------|------------------------------|------------|-------|--------|--------|----------|----------|----------|--------|------------|-------|-----|
| MONTH OF APRIL | | HOUR 8 | | | | | NUMBER OBS. 540 | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | |
| | | CROSSWIND LIMITS PERCENTAGES | | | | | CROSSWIND LIMITS PERCENTAGES | | | | | | | | | | | |
| 1 TO 4 | .56 | .93 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .74 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10- UP | .00 | .00 | .56 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .56 | 2.04 | 1.30 | .56 | .37 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

TABLE 4.3. (Continued)

| MSC PEAR WINDS | | | | | | | | | | TAILWINDS VS CROSSWINDS | | | | | | | | | |
|-----------------|--------|------------------|--------|-------------|-----------------|-----------------|--------|------------------|--------|-------------------------|--------|-----------------|--------|------------------|-----------------|-------------|--------|-------|-------|
| MONTH OF APRIL | | | | | | | | | | MONTH OF APRIL | | | | | | | | | |
| MOUF 9 | | | | | NUMBER OBS. 540 | | | | | MOUF 9 | | | | | NUMBER OBS. 540 | | | | |
| TAILWIND LIMITS | | CROSSWIND LIMITS | | PERCENTAGES | | TAILWIND LIMITS | | CROSSWIND LIMITS | | PERCENTAGES | | TAILWIND LIMITS | | CROSSWIND LIMITS | | PERCENTAGES | | TOTAL | |
| 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 25-UP | TOTAL |
| .19 | .00 | .74 | .56 | .00 | .00 | .00 | .00 | .93 | .93 | 2.41 | 1.08 | .37 | .37 | .37 | .37 | .37 | .37 | .37 | 5.93 |
| .00 | .00 | .56 | .93 | .00 | .00 | .00 | .00 | 2.22 | 19.48 | 1.11 | .93 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 22.22 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.78 | 2.78 | 55.19 | 6.88 | .19 | .19 | .19 | .19 | .19 | .19 | .19 | 65.74 |
| .19 | .00 | 1.30 | 2.22 | 2.04 | .19 | .00 | .00 | 5.93 | 23.15 | 58.70 | 8.89 | 1.08 | .56 | .56 | .56 | .56 | .56 | .56 | 93.89 |
| MSC PEAR WINDS | | | | | | | | | | TAILWINDS VS CROSSWINDS | | | | | | | | | |
| MONTH OF APRIL | | | | | | | | | | MONTH OF APRIL | | | | | | | | | |
| MOUF 10 | | | | | NUMBER OBS. 540 | | | | | MOUF 10 | | | | | NUMBER OBS. 540 | | | | |
| TAILWIND LIMITS | | CROSSWIND LIMITS | | PERCENTAGES | | TAILWIND LIMITS | | CROSSWIND LIMITS | | PERCENTAGES | | TAILWIND LIMITS | | CROSSWIND LIMITS | | PERCENTAGES | | TOTAL | |
| 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 25-UP | TOTAL |
| .19 | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .37 | .07 | .74 | .92 | .19 | .19 | .19 | .19 | .19 | .19 | .19 | 2.78 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.15 | 3.15 | 60.00 | 7.78 | .56 | .56 | .56 | .56 | .56 | .56 | .56 | 10.93 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 6.48 | 19.24 | 61.67 | 9.26 | 2.04 | .37 | .37 | .37 | .37 | .37 | .37 | 72.04 |
| .19 | .00 | 1.30 | 2.22 | 2.04 | .19 | .00 | .00 | 6.48 | 19.24 | 61.67 | 9.26 | 2.04 | .37 | .37 | .37 | .37 | .37 | .37 | 93.15 |
| MSC PEAR WINDS | | | | | | | | | | TAILWINDS VS CROSSWINDS | | | | | | | | | |
| MONTH OF APRIL | | | | | | | | | | MONTH OF APRIL | | | | | | | | | |
| MOUF 11 | | | | | NUMBER OBS. 540 | | | | | MOUF 11 | | | | | NUMBER OBS. 540 | | | | |
| TAILWIND LIMITS | | CROSSWIND LIMITS | | PERCENTAGES | | TAILWIND LIMITS | | CROSSWIND LIMITS | | PERCENTAGES | | TAILWIND LIMITS | | CROSSWIND LIMITS | | PERCENTAGES | | TOTAL | |
| 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 25-UP | TOTAL |
| .00 | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .19 | .00 | .37 | .37 | .19 | .19 | .19 | .19 | .19 | .19 | .19 | 1.30 |
| .00 | .00 | .19 | .74 | .00 | .00 | .00 | .00 | 1.67 | 12.59 | .56 | 1.08 | .56 | .56 | .56 | .56 | .56 | .56 | .56 | 15.37 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.72 | 2.04 | 65.56 | 10.56 | .56 | .56 | .56 | .56 | .56 | .56 | .56 | 79.07 |
| .00 | .00 | .37 | 1.05 | 1.08 | .19 | .00 | .00 | 4.97 | 10.63 | 66.48 | 12.91 | 1.08 | .19 | .19 | .19 | .19 | .19 | .19 | 95.74 |

TABLE 4.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF APRIL | | NUMBER OBS. 540 | |
|--------------------------|-----|--------------------------|-----|--------------------------|-----|--------------------------|-----|
| HOUR 12 | | HOUR 13 | | HOUR 14 | | HOUR 15 | |
| TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | |
| 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 |
| 5 TO 9 | .00 | 5 TO 9 | .00 | 5 TO 9 | .00 | 5 TO 9 | .00 |
| 10-UP | .00 | 10-UP | .00 | 10-UP | .00 | 10-UP | .00 |
| TOTAL | .00 | TOTAL | .00 | TOTAL | .00 | TOTAL | .00 |
| RUNWAY 15 | | RUNWAY 15 | | RUNWAY 15 | | RUNWAY 15 | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | |
| 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 |
| 5 TO 9 | .19 | 5 TO 9 | .00 | 5 TO 9 | .00 | 5 TO 9 | .00 |
| 10-UP | .74 | 10-UP | .19 | 10-UP | .37 | 10-UP | .37 |
| TOTAL | .93 | TOTAL | .19 | TOTAL | .37 | TOTAL | .37 |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 |
| 5 TO 9 | .19 | 5 TO 9 | .00 | 5 TO 9 | .00 | 5 TO 9 | .00 |
| 10-UP | .74 | 10-UP | .19 | 10-UP | .37 | 10-UP | .37 |
| TOTAL | .93 | TOTAL | .19 | TOTAL | .37 | TOTAL | .37 |
| KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | |
| 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 |
| 5 TO 9 | .00 | 5 TO 9 | .00 | 5 TO 9 | .00 | 5 TO 9 | .00 |
| 10-UP | .00 | 10-UP | .00 | 10-UP | .00 | 10-UP | .00 |
| TOTAL | .00 | TOTAL | .00 | TOTAL | .00 | TOTAL | .00 |
| RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | |
| 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 |
| 5 TO 9 | .19 | 5 TO 9 | .00 | 5 TO 9 | .00 | 5 TO 9 | .00 |
| 10-UP | .74 | 10-UP | .19 | 10-UP | .37 | 10-UP | .37 |
| TOTAL | .93 | TOTAL | .19 | TOTAL | .37 | TOTAL | .37 |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 | 1 TO 4 | .00 |
| 5 TO 9 | .19 | 5 TO 9 | .00 | 5 TO 9 | .00 | 5 TO 9 | .00 |
| 10-UP | .74 | 10-UP | .19 | 10-UP | .37 | 10-UP | .37 |
| TOTAL | .93 | TOTAL | .19 | TOTAL | .37 | TOTAL | .37 |

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TABLE 4.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|--------|----------|----------|-----------|----------|--------|------------------------------|----------|------------|--------|-------|
| MONTH OF APRIL | | NUMBER OPS. 540 | | | | | RUNWAY 33 | | | | | | | |
| HOUR 15 | | ZERO CROSS | | 25- UP | | 1 TO 5 | | 5 TO 9 | | CROSSWIND LIMITS PERCENTAGES | | ZERO CROSS | TOTAL | |
| TAILWIND LIMITS | 1 TO 5 | 5 TO 9 | 1 TO 5 | 5 TO 9 | 15 TO 19 | 20 TO 24 | 15 TO 19 | 20 TO 24 | 25- UP | 25- UP | 15 TO 19 | 20 TO 24 | 25- UP | TOTAL |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .37 |
| 5 TO 9 | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 8.89 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 89.07 |
| TOTAL | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 98.33 |
| | | ZERO CROSS | | 25- UP | | 1 TO 5 | | 5 TO 9 | | CROSSWIND LIMITS PERCENTAGES | | ZERO CROSS | TOTAL | |
| | | .00 | | .00 | | .00 | | .00 | | .00 | | .00 | .37 | |
| | | .56 | | .19 | | .37 | | .37 | | .00 | | .00 | 8.89 | |
| | | .74 | | .56 | | .93 | | .93 | | .19 | | .00 | 89.07 | |
| | | 1.30 | | 5.93 | | 77.94 | | 13.70 | | 1.30 | | .00 | 98.33 | |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|--------|----------|----------|-----------|----------|--------|------------------------------|----------|------------|--------|-------|
| MONTH OF APRIL | | NUMBER OBS. 540 | | | | | RUNWAY 33 | | | | | | | |
| HOUR 16 | | ZERO CROSS | | 25- UP | | 1 TO 5 | | 5 TO 9 | | CROSSWIND LIMITS PERCENTAGES | | ZERO CROSS | TOTAL | |
| TAILWIND LIMITS | 1 TO 5 | 5 TO 9 | 1 TO 5 | 5 TO 9 | 15 TO 19 | 20 TO 24 | 15 TO 19 | 20 TO 24 | 25- UP | 25- UP | 15 TO 19 | 20 TO 24 | 25- UP | TOTAL |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .37 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 13.15 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 84.63 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 98.15 |
| | | ZERO CROSS | | 25- UP | | 1 TO 5 | | 5 TO 9 | | CROSSWIND LIMITS PERCENTAGES | | ZERO CROSS | TOTAL | |
| | | .00 | | .00 | | .00 | | .00 | | .00 | | .00 | .37 | |
| | | .37 | | .00 | | .00 | | .00 | | .00 | | .00 | 13.15 | |
| | | .74 | | .19 | | .74 | | .74 | | .00 | | .00 | 84.63 | |
| | | 1.08 | | 10.56 | | 73.15 | | 12.22 | | 1.07 | | .00 | 98.15 | |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|--------|----------|----------|-----------|----------|--------|------------------------------|----------|------------|--------|-------|
| MONTH OF APRIL | | NUMBER OBS. 540 | | | | | RUNWAY 33 | | | | | | | |
| HOUR 17 | | ZERO CROSS | | 25- UP | | 1 TO 5 | | 5 TO 9 | | CROSSWIND LIMITS PERCENTAGES | | ZERO CROSS | TOTAL | |
| TAILWIND LIMITS | 1 TO 5 | 5 TO 9 | 1 TO 5 | 5 TO 9 | 15 TO 19 | 20 TO 24 | 15 TO 19 | 20 TO 24 | 25- UP | 25- UP | 15 TO 19 | 20 TO 24 | 25- UP | TOTAL |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .56 |
| 5 TO 9 | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 18.89 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 79.26 |
| TOTAL | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 98.70 |
| | | ZERO CROSS | | 25- UP | | 1 TO 5 | | 5 TO 9 | | CROSSWIND LIMITS PERCENTAGES | | ZERO CROSS | TOTAL | |
| | | .00 | | .00 | | .00 | | .00 | | .00 | | .00 | .56 | |
| | | .37 | | .00 | | .00 | | .00 | | .00 | | .00 | 18.89 | |
| | | .56 | | .00 | | .00 | | .00 | | .00 | | .00 | 79.26 | |
| | | .93 | | 15.00 | | 72.04 | | 10.10 | | .93 | | .00 | 98.70 | |

TABLE 4.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| MPS | MSC PEAK WINDS | | HEAD/TAIL WIND REVERSALS | | MONTH OF APRIL | |
|-------|----------------------|----------------------|--------------------------|----------------------|----------------------|----------------------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 3.08 | 1.89 | 1.55 | 1.53 | 60.98 | 60.98 |
| 03-05 | 4.52 | 2.66 | 1.86 | 2.79 | 41.67 | 41.67 |
| 06-08 | 6.51 | 3.41 | 3.10 | 3.61 | 56.18 | 56.18 |
| 09-11 | 5.58 | 2.23 | 3.35 | 2.36 | 60.67 | 60.67 |
| 12-14 | 2.42 | .99 | 1.43 | 1.31 | 74.19 | 74.19 |
| 15-17 | 1.61 | .68 | .93 | .69 | 75.00 | 75.00 |
| 18-20 | 2.17 | 1.49 | .68 | 1.51 | 52.38 | 52.38 |
| 21-23 | 2.54 | 1.24 | 1.30 | 1.28 | 44.68 | 44.68 |
| 00-23 | 3.55 | 1.77 | 1.77 | 1.83 | 55.85 | 55.85 |

| MPS | MSC PEAK WINDS | | HEAD/TAIL WIND REVERSALS | | MONTH OF APRIL | |
|-------|----------------------|----------------------|--------------------------|----------------------|----------------------|----------------------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 3.08 | 1.89 | 1.55 | 1.53 | 60.98 | 60.98 |
| 03-05 | 4.52 | 2.66 | 1.86 | 2.79 | 41.67 | 41.67 |
| 06-08 | 6.51 | 3.41 | 3.10 | 3.61 | 56.18 | 56.18 |
| 09-11 | 5.58 | 2.23 | 3.35 | 2.36 | 60.67 | 60.67 |
| 12-14 | 2.42 | .99 | 1.43 | 1.31 | 74.19 | 74.19 |
| 15-17 | 1.61 | .68 | .93 | .69 | 75.00 | 75.00 |
| 18-20 | 2.17 | 1.49 | .68 | 1.51 | 52.38 | 52.38 |
| 21-23 | 2.54 | 1.24 | 1.30 | 1.28 | 44.68 | 44.68 |
| 00-23 | 3.55 | 1.77 | 1.77 | 1.83 | 55.85 | 55.85 |

| MPS | MSC PEAK WINDS | | HEAD/TAIL WIND REVERSALS | | MONTH OF APRIL | |
|-------|----------------------|----------------------|--------------------------|----------------------|----------------------|----------------------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 3.08 | 1.89 | 1.55 | 1.53 | 60.98 | 60.98 |
| 03-05 | 4.52 | 2.66 | 1.86 | 2.79 | 41.67 | 41.67 |
| 06-08 | 6.51 | 3.41 | 3.10 | 3.61 | 56.18 | 56.18 |
| 09-11 | 5.58 | 2.23 | 3.35 | 2.36 | 60.67 | 60.67 |
| 12-14 | 2.42 | .99 | 1.43 | 1.31 | 74.19 | 74.19 |
| 15-17 | 1.61 | .68 | .93 | .69 | 75.00 | 75.00 |
| 18-20 | 2.17 | 1.49 | .68 | 1.51 | 52.38 | 52.38 |
| 21-23 | 2.54 | 1.24 | 1.30 | 1.28 | 44.68 | 44.68 |
| 00-23 | 3.55 | 1.77 | 1.77 | 1.83 | 55.85 | 55.85 |

| MPS | MSC PEAK WINDS | | HEAD/TAIL WIND REVERSALS | | MONTH OF APRIL | |
|-------|----------------------|----------------------|--------------------------|----------------------|----------------------|----------------------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 3.08 | 1.89 | 1.55 | 1.53 | 60.98 | 60.98 |
| 03-05 | 4.52 | 2.66 | 1.86 | 2.79 | 41.67 | 41.67 |
| 06-08 | 6.51 | 3.41 | 3.10 | 3.61 | 56.18 | 56.18 |
| 09-11 | 5.58 | 2.23 | 3.35 | 2.36 | 60.67 | 60.67 |
| 12-14 | 2.42 | .99 | 1.43 | 1.31 | 74.19 | 74.19 |
| 15-17 | 1.61 | .68 | .93 | .69 | 75.00 | 75.00 |
| 18-20 | 2.17 | 1.49 | .68 | 1.51 | 52.38 | 52.38 |
| 21-23 | 2.54 | 1.24 | 1.30 | 1.28 | 44.68 | 44.68 |
| 00-23 | 3.55 | 1.77 | 1.77 | 1.83 | 55.85 | 55.85 |

| MPS | MSC PEAK WINDS | | HEAD/TAIL WIND REVERSALS | | MONTH OF APRIL | |
|-------|----------------------|----------------------|--------------------------|----------------------|----------------------|----------------------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 3.08 | 1.89 | 1.55 | 1.53 | 60.98 | 60.98 |
| 03-05 | 4.52 | 2.66 | 1.86 | 2.79 | 41.67 | 41.67 |
| 06-08 | 6.51 | 3.41 | 3.10 | 3.61 | 56.18 | 56.18 |
| 09-11 | 5.58 | 2.23 | 3.35 | 2.36 | 60.67 | 60.67 |
| 12-14 | 2.42 | .99 | 1.43 | 1.31 | 74.19 | 74.19 |
| 15-17 | 1.61 | .68 | .93 | .69 | 75.00 | 75.00 |
| 18-20 | 2.17 | 1.49 | .68 | 1.51 | 52.38 | 52.38 |
| 21-23 | 2.54 | 1.24 | 1.30 | 1.28 | 44.68 | 44.68 |
| 00-23 | 3.55 | 1.77 | 1.77 | 1.83 | 55.85 | 55.85 |

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TABLE 4.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY COMPONENT CLASS (4-DIGIT) | HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF APRIL | | | | | | | | | | | |
|---|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | ASC PER WINDS | | | | 000 RUNWAY 15 000 | | | | 000 RUNWAY 33 000 | | | |
| | HOURS 08-00 CPF | HOURS 09-11 CPF | HOURS 12-10 CPF | HOURS 13-17 CPF | HOURS 06-17 CPF | HOURS 06-00 CPF | HOURS 09-11 CPF | HOURS 12-10 CPF | HOURS 12-10 CPF | HOURS 15-17 CPF | HOURS 06-17 CPF | HOURS 08-17 CPF |
| 1-1 | 3.53 | 1.11 | .25 | .37 | 1.30 | 11.88 | 8.30 | 11.93 | 23.08 | 10.20 | 10.20 | |
| 1-2 | 6.67 | 2.76 | .57 | .50 | 2.58 | 11.88 | 8.30 | 11.93 | 23.08 | 13.76 | 13.76 | |
| 2-3 | 16.07 | 2.94 | .63 | .62 | 3.50 | 37.62 | 5.38 | 11.93 | 23.08 | 26.78 | 26.78 | |
| 3-4 | 15.57 | 3.33 | .63 | .69 | 6.96 | 46.53 | 10.75 | 11.93 | 23.08 | 30.20 | 30.20 | |
| 4-5 | 20.93 | 3.79 | .76 | .81 | 6.95 | 50.46 | 12.90 | 11.93 | 23.08 | 37.25 | 37.25 | |
| 5-6 | 29.69 | 4.90 | 1.20 | 1.37 | 10.91 | 64.34 | 16.29 | 11.93 | 23.08 | 43.53 | 43.53 | |
| 6-7 | 38.66 | 6.87 | 1.51 | 1.81 | 13.33 | 71.29 | 25.81 | 20.00 | 30.77 | 51.37 | 51.37 | |
| 7-8 | 40.29 | 8.95 | 2.14 | 2.87 | 13.33 | 78.22 | 33.33 | 20.00 | 30.77 | 58.49 | 58.49 | |
| 8-9 | 45.72 | 12.08 | 3.78 | 5.37 | 16.50 | 84.18 | 40.00 | 20.00 | 30.77 | 65.49 | 65.49 | |
| 9-10 | 56.31 | 23.51 | 10.32 | 16.62 | 25.91 | 89.11 | 52.69 | 20.00 | 30.77 | 71.37 | 71.37 | |
| 10-11 | 62.66 | 30.37 | 16.68 | 22.98 | 32.89 | 90.10 | 61.29 | 20.00 | 30.77 | 78.82 | 78.82 | |
| 11-12 | 68.02 | 37.82 | 24.01 | 29.50 | 39.72 | 92.00 | 67.74 | 20.00 | 30.77 | 84.31 | 84.31 | |
| 12-13 | 73.66 | 46.20 | 36.06 | 39.96 | 49.22 | 95.05 | 77.42 | 20.00 | 30.77 | 88.46 | 88.46 | |
| 13-14 | 78.88 | 54.87 | 42.73 | 47.12 | 53.61 | 95.05 | 84.95 | 20.00 | 30.77 | 91.76 | 91.76 | |
| 14-15 | 82.60 | 63.81 | 51.92 | 55.75 | 63.32 | 98.08 | 88.17 | 20.00 | 30.77 | 96.86 | 96.86 | |
| 15-16 | 86.27 | 69.17 | 61.11 | 62.17 | 69.88 | 98.08 | 95.70 | 20.00 | 30.77 | 97.25 | 97.25 | |
| 16-17 | 89.10 | 74.72 | 68.47 | 69.50 | 74.19 | 98.08 | 97.87 | 20.00 | 30.77 | 98.43 | 98.43 | |
| 17-18 | 91.11 | 77.99 | 73.32 | 74.19 | 85.17 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 18-19 | 93.79 | 85.50 | 79.80 | 81.94 | 91.52 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 19-20 | 96.88 | 91.97 | 88.11 | 86.37 | 93.63 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 20-21 | 97.88 | 93.53 | 91.25 | 92.06 | 95.83 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 21-22 | 98.56 | 96.15 | 94.21 | 94.50 | 95.82 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 22-23 | 98.82 | 97.00 | 95.97 | 95.75 | 97.74 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 23-24 | 99.15 | 97.71 | 96.79 | 97.56 | 98.43 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 24-25 | 99.48 | 98.56 | 97.29 | 98.44 | 98.85 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 25-26 | 99.80 | 98.95 | 97.84 | 98.81 | 99.23 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 26-27 | 99.80 | 99.35 | 98.62 | 99.19 | 99.49 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 27-28 | 99.80 | 99.48 | 99.12 | 99.56 | 99.65 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 28-29 | 99.80 | 99.61 | 99.26 | 99.87 | 99.85 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 29-30 | 100.00 | 99.74 | 99.75 | 99.87 | 99.86 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 30-31 | 100.00 | 99.87 | 99.94 | 99.87 | 99.92 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 31-32 | 100.00 | 99.93 | 99.94 | 100.00 | 99.95 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 32-33 | 100.00 | 99.93 | 99.94 | 100.00 | 99.97 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 33-34 | 100.00 | 99.93 | 99.94 | 100.00 | 99.97 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 34-35 | 100.00 | 99.93 | 99.94 | 100.00 | 99.97 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 35-36 | 100.00 | 99.93 | 99.94 | 100.00 | 99.97 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 36-37 | 100.00 | 99.93 | 99.94 | 100.00 | 99.97 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 37-38 | 100.00 | 99.93 | 99.94 | 100.00 | 99.97 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 38-39 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 39-40 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 40-41 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 41-42 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 42-43 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 43-44 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 44-45 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 45-46 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 46-47 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 47-48 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 48-49 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-51 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-52 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-53 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-54 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-55 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-56 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-57 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-58 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-59 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-60 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-61 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-62 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-63 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-64 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-65 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-66 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-67 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-68 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-69 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-70 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-71 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-72 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-73 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-74 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-75 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-76 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-77 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-78 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-79 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-80 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-81 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-82 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-83 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-84 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-85 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-86 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-87 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-88 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-89 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-90 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-91 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-92 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-93 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-94 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-95 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97.87 | 20.00 | 30.77 | 98.57 | 98.57 | |
| 50-96 | 100.00 | 99.93 | 99.94 | 100.00 | 99.98 | 98.08 | 97. | | | | | |

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TABLE 5.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| HRS | MSC PEAK WINDS - 15TH OF MAY | | | | | | | | | | TOTAL NUMBER OBS | |
|-------|------------------------------|--------|----------|----------|----------|----------|----------------|-------|--|--|------------------|-------|
| | CROSSWIND | | | | | | | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | ZERO CROSSWIND | | | | | |
| 00-02 | 59.74 | 30.65 | 3.23 | .36 | .06 | .00 | 5.97 | 1674 | | | | 1674 |
| 03-05 | 67.26 | 23.78 | 2.03 | .42 | .06 | .00 | 6.45 | 1674 | | | | 1674 |
| 06-08 | 51.79 | 38.59 | 4.54 | .42 | .18 | .00 | 4.48 | 1674 | | | | 1674 |
| 09-11 | 23.06 | 65.59 | 8.19 | 1.67 | .42 | .12 | .96 | 1674 | | | | 1674 |
| 12-14 | 8.06 | 78.38 | 16.51 | 1.91 | .54 | .30 | .30 | 1674 | | | | 1674 |
| 15-17 | 11.13 | 76.64 | 11.47 | 1.06 | .36 | .06 | .36 | 1674 | | | | 1674 |
| 18-20 | 38.29 | 55.14 | 4.36 | .97 | .24 | .12 | .96 | 1674 | | | | 1674 |
| 21-23 | 53.64 | 38.71 | 3.52 | .42 | .00 | .00 | 3.70 | 1674 | | | | 1674 |
| 24-27 | 49.13 | 50.79 | 5.98 | .90 | .23 | .07 | 2.90 | 13372 | | | | 13372 |

TABLE 5.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| HRS | MSC PEAK WINDS MONTH OF MAY | | | | | | | | | | TOTAL NUMBER OBS |
|-------|-----------------------------|--------|----------|--------|--------|----------|--------|--------|----------|-------------|------------------|
| | TAILWIND | | | | | | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 ABOVE | 1 TO 4 | 5 TO 9 | 10 ABOVE | 1 TO 4 | 5 TO 9 | 10 ABOVE | PERCENTAGES | |
| 00-02 | 1.97 | .66 | .36 | 1674 | 19.89 | 48.45 | 27.12 | 19.89 | 48.45 | 27.12 | 1674 |
| 03-05 | 2.63 | .60 | .30 | 1674 | 29.21 | 45.46 | 19.53 | 29.21 | 45.46 | 19.53 | 1674 |
| 06-08 | 2.09 | 1.31 | .84 | 1674 | 18.28 | 40.68 | 35.19 | 18.28 | 40.68 | 35.19 | 1674 |
| 09-11 | .12 | 1.61 | .84 | 1674 | 2.63 | 24.43 | 70.19 | 2.63 | 24.43 | 70.19 | 1674 |
| 12-14 | .00 | .66 | .72 | 1674 | .66 | 10.16 | 87.51 | .66 | 10.16 | 87.51 | 1674 |
| 15-17 | .00 | .48 | .66 | 1674 | .96 | 13.68 | 84.05 | .96 | 13.68 | 84.05 | 1674 |
| 18-20 | .48 | .76 | .84 | 1674 | 7.35 | 37.63 | 52.75 | 7.35 | 37.63 | 52.75 | 1674 |
| 21-23 | 1.14 | .78 | .36 | 1674 | 13.44 | 44.92 | 38.41 | 13.44 | 44.92 | 38.41 | 1674 |
| 24-27 | 1.05 | .94 | .61 | 12392 | 11.55 | 33.18 | 51.84 | 11.55 | 33.18 | 51.84 | 12392 |

TABLE 5.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | |
|--------------------------|------|-------------------------|-----|-----|-----|------|-------|-------|------|-----|-------|------------|--------|--------|----------|----------|----------|--------|------------|-------|-------|
| MONTH OF MAY | | NUMBER OBS. | | | | | SSB | | | | | | | | | | | | | | |
| HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | TOTAL | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | |
| RUNWAY 15 | | | | | | | | | | | | | | | | | | | | | |
| *** CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | | | | | | | | | |
| 1 TO 4 | 1.25 | .36 | .00 | .00 | .00 | 1.61 | 14.52 | 1.83 | .00 | .00 | 17.20 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.04 | 17.20 |
| 5 TO 9 | .00 | .54 | .10 | .00 | .00 | .72 | 39.06 | 4.12 | .54 | .00 | 47.31 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.69 | 47.31 |
| 10- UP | .20 | .70 | .18 | .18 | .00 | .36 | .97 | 28.32 | 2.51 | .00 | 31.90 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | 31.90 |
| TOTAL | 1.25 | .90 | .36 | .36 | .00 | 2.69 | 55.34 | 33.07 | 3.05 | .00 | 96.42 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.94 | 96.42 |
| KSC PEAK WINDS | | | | | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF MAY | | | | | | | | | | | | | | | | | | | | | |
| NUMBER OBS. | | | | | | | | | | | | | | | | | | | | | |
| SSB | | | | | | | | | | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | | | | | | | | | | |
| *** CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | | | | | | | | | |
| 1 TO 4 | 1.08 | .18 | .00 | .00 | .00 | 1.25 | 15.81 | 2.15 | .36 | .00 | 19.09 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.97 | 19.09 |
| 5 TO 9 | .00 | .18 | .00 | .00 | .00 | .72 | 43.01 | 3.41 | .72 | .00 | 49.02 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.69 | 49.02 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .36 | 1.08 | 23.30 | 1.08 | .00 | 25.63 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 25.63 |
| TOTAL | 1.08 | .36 | .00 | .00 | .00 | 2.33 | 59.50 | 28.85 | 2.15 | .00 | 95.34 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 4.66 | 95.34 |
| KSC PEAK WINDS | | | | | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF MAY | | | | | | | | | | | | | | | | | | | | | |
| NUMBER OBS. | | | | | | | | | | | | | | | | | | | | | |
| SSB | | | | | | | | | | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | | | | | | | | | | |
| *** CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | | | | | | | | | |
| 1 TO 4 | 2.51 | .54 | .00 | .00 | .00 | 3.05 | 16.49 | 3.23 | .00 | .00 | 22.58 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.51 | 22.58 |
| 5 TO 9 | .00 | .18 | .00 | .00 | .00 | .36 | 41.76 | 3.97 | .90 | .00 | 48.21 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.15 | 48.21 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .36 | 1.25 | 20.61 | 1.97 | .00 | 23.64 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 23.64 |
| TOTAL | 2.51 | .72 | .00 | .00 | .00 | 3.74 | 59.50 | 27.24 | 2.87 | .00 | 94.66 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 4.66 | 94.66 |

TABLE 5.3. (Continued)

KSC PEAK WINDS MONTH OF MAY

| TAILWIND LIMITS | PUNWAY 15 | | | | PUNWAY 33 | | | | TOTAL | ZERO CROSS | 25- UP | 25- UP | ZERO CROSS | TOTAL |
|-----------------|-----------|--------|----------|----------|-----------|--------|----------|----------|-------|------------|--------|--------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | | | | | | |
| 1 TO 4 | 2.33 | .54 | .00 | .00 | 2.87 | 19.71 | 2.51 | .00 | .00 | .18 | .00 | .00 | 2.69 | 25.09 |
| 5 TO 9 | .00 | .36 | .00 | .00 | .72 | 13.91 | 3.05 | .72 | .00 | .00 | .00 | .00 | 1.08 | 48.92 |
| 10-UP | .00 | .00 | .00 | .00 | .18 | 1.08 | 18.10 | .90 | .00 | .00 | .00 | .00 | .18 | 20.25 |
| TOTAL | 2.33 | .90 | .00 | .00 | 3.76 | 64.70 | 23.66 | 1.61 | .18 | .18 | .00 | .00 | 3.94 | 94.27 |

KSC PEAK WINDS MONTH OF MAY

| TAILWIND LIMITS | PUNWAY 15 | | | | PUNWAY 33 | | | | TOTAL | ZERO CROSS | 25- UP | 25- UP | ZERO CROSS | TOTAL |
|-----------------|-----------|--------|----------|----------|-----------|--------|----------|----------|-------|------------|--------|--------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | | | | | | |
| 1 TO 4 | 1.79 | .36 | .00 | .00 | 2.15 | 23.30 | 2.69 | .36 | .00 | .00 | .00 | .00 | 2.87 | 29.21 |
| 5 TO 9 | .00 | .14 | .00 | .00 | .18 | 1.08 | 16.85 | 1.25 | .00 | .00 | .00 | .00 | .18 | 19.18 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.79 | .54 | .00 | .00 | 2.33 | 66.85 | 21.51 | 2.15 | .18 | .00 | .00 | .00 | 3.05 | 48.39 |

KSC PEAK WINDS MONTH OF MAY

| TAILWIND LIMITS | PUNWAY 15 | | | | PUNWAY 33 | | | | TOTAL | ZERO CROSS | 25- UP | 25- UP | ZERO CROSS | TOTAL |
|-----------------|-----------|--------|----------|----------|-----------|--------|----------|----------|-------|------------|--------|--------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | | | | | | |
| 1 TO 4 | 1.97 | .90 | .00 | .00 | 2.87 | 26.14 | 4.12 | .18 | .00 | .00 | .00 | .00 | 2.69 | 33.33 |
| 5 TO 9 | .00 | .36 | .00 | .00 | .72 | 36.74 | 2.33 | .36 | .00 | .00 | .00 | .00 | 1.25 | 40.86 |
| 10-UP | .00 | .00 | .00 | .00 | .18 | 1.25 | 17.03 | .54 | .00 | .00 | .00 | .00 | .36 | 19.18 |
| TOTAL | 1.97 | 1.25 | .00 | .00 | 3.76 | 64.16 | 23.48 | 1.08 | .36 | .00 | .00 | .00 | 4.30 | 93.37 |

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TABLE 5.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
|-----------------|------|-------------------------|-----|-----|-----|------|------------------|-------|------|-----|-----|-----|------|-------|
| MONTH OF MAY | | MONTH OF MAY | | | | | | | | | | | | |
| HOUR 6 | | NUMBER OBS. 558 | | | | | | | | | | | | |
| | | PUNWAY 15 | | | | | PUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | | | |
| 1 TO 4 | | 5 TO 9 | | | | | 10 TO 14 | | | | | | | |
| PERCENTAGES | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | |
| 1 TO 4 | | 5 TO 9 | | | | | 10 TO 14 | | | | | | | |
| 10-UP | | 25-UP | | | | | 25-UP | | | | | | | |
| TOTAL | | TOTAL | | | | | TOTAL | | | | | | | |
| ZERO CROSS | | ZERO CROSS | | | | | ZERO CROSS | | | | | | | |
| 1 TO 4 | 1.61 | .90 | .00 | .00 | .00 | 2.51 | 26.16 | 2.51 | .18 | .00 | .00 | .00 | 2.67 | 31.59 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .90 | 37.85 | 1.97 | .94 | .00 | .00 | .00 | 1.43 | 41.78 |
| 10-UP | .00 | .00 | .18 | .00 | .00 | .36 | .72 | 17.92 | 1.25 | .00 | .00 | .00 | .18 | 20.07 |
| TOTAL | 1.61 | 1.79 | .00 | .18 | .00 | 3.76 | 64.34 | 22.40 | 1.97 | .36 | .00 | .00 | 4.30 | 93.37 |
| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
| MONTH OF MAY | | MONTH OF MAY | | | | | | | | | | | | |
| HOUR 7 | | NUMBER OBS. 558 | | | | | | | | | | | | |
| | | PUNWAY 15 | | | | | PUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | | | |
| 1 TO 4 | | 5 TO 9 | | | | | 10 TO 14 | | | | | | | |
| PERCENTAGES | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | |
| 1 TO 4 | | 5 TO 9 | | | | | 10 TO 14 | | | | | | | |
| 10-UP | | 25-UP | | | | | 25-UP | | | | | | | |
| TOTAL | | TOTAL | | | | | TOTAL | | | | | | | |
| ZERO CROSS | | ZERO CROSS | | | | | ZERO CROSS | | | | | | | |
| 1 TO 4 | 1.61 | 1.25 | .00 | .00 | .00 | 2.97 | 9.86 | 4.48 | .90 | .00 | .00 | .00 | 1.43 | 16.67 |
| 5 TO 9 | .00 | .00 | .18 | .00 | .00 | 1.08 | 38.53 | 2.33 | .54 | .00 | .00 | .00 | .72 | 92.11 |
| 10-UP | .00 | .00 | .00 | .72 | .00 | .90 | 2.15 | 29.75 | 2.69 | .00 | .00 | .00 | .18 | 34.77 |
| TOTAL | 1.61 | 2.15 | .00 | .72 | .00 | 4.94 | 50.54 | 36.56 | 4.12 | .00 | .00 | .00 | 2.33 | 93.55 |
| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
| MONTH OF MAY | | MONTH OF MAY | | | | | | | | | | | | |
| HOUR 8 | | NUMBER OBS. 558 | | | | | | | | | | | | |
| | | PUNWAY 15 | | | | | PUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | | | |
| 1 TO 4 | | 5 TO 9 | | | | | 10 TO 14 | | | | | | | |
| PERCENTAGES | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | |
| 1 TO 4 | | 5 TO 9 | | | | | 10 TO 14 | | | | | | | |
| 10-UP | | 25-UP | | | | | 25-UP | | | | | | | |
| TOTAL | | TOTAL | | | | | TOTAL | | | | | | | |
| ZERO CROSS | | ZERO CROSS | | | | | ZERO CROSS | | | | | | | |
| 1 TO 4 | .36 | .54 | .00 | .00 | .00 | .93 | 2.51 | 1.57 | .36 | .18 | .00 | .00 | .00 | 6.63 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | 1.97 | 38.09 | 2.07 | 1.79 | .78 | .00 | .00 | 1.25 | 30.17 |
| 10-UP | .00 | .00 | .00 | .72 | .00 | .36 | .72 | 45.16 | 2.51 | .00 | .00 | .00 | .72 | 50.72 |
| TOTAL | .36 | 1.25 | .00 | .72 | .00 | 3.26 | 36.92 | 51.91 | 4.66 | .36 | .00 | .00 | 1.97 | 95.52 |

TABLE 5.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF MAY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | ZERO CROSS | | 25- UP | | TOTAL | |
|-----------------|--------|-------------------------|----------|--------------|----------|-----------------|------------|-----------|--------|----------------------|----------|-------------|----------|------------|------------|--------|------------|-------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 25- UP | ZERO CROSS | TOTAL | |
| 1 TO 4 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .18 | .72 | 2.51 | 1.25 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 4.48 |
| 5 TO 9 | .00 | .90 | .00 | .19 | .00 | .00 | .00 | 1.97 | 24.37 | 1.08 | 1.61 | .00 | .00 | .00 | 1.08 | .00 | .00 | .00 | 29.21 |
| 10- UP | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .90 | 2.69 | 55.73 | 3.76 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 62.90 |
| TOTAL | .00 | 1.08 | .00 | .36 | .00 | .00 | .00 | 3.05 | 27.78 | 59.32 | 6.63 | 1.08 | .00 | .00 | 1.08 | .00 | .00 | .00 | 96.59 |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF MAY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | ZERO CROSS | | 25- UP | | TOTAL | |
|-----------------|--------|-------------------------|----------|--------------|----------|-----------------|------------|-----------|--------|----------------------|----------|-------------|----------|------------|------------|--------|------------|-------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 25- UP | ZERO CROSS | TOTAL | |
| 1 TO 4 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .18 | .18 | .72 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.79 |
| 5 TO 9 | .00 | .90 | .00 | .19 | .00 | .00 | .00 | 1.97 | 21.37 | 1.03 | 1.61 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 25.09 |
| 10- UP | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .90 | 3.58 | 62.01 | 4.48 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 70.25 |
| TOTAL | .00 | .18 | .00 | .36 | .00 | .00 | .00 | 2.69 | 25.09 | 64.16 | 6.45 | .90 | .00 | .00 | .00 | .00 | .00 | .00 | 97.13 |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF MAY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | ZERO CROSS | | 25- UP | | TOTAL | |
|-----------------|--------|-------------------------|----------|--------------|----------|-----------------|------------|-----------|--------|----------------------|----------|-------------|----------|------------|------------|--------|------------|-------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 25- UP | ZERO CROSS | TOTAL | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.61 |
| 5 TO 9 | .00 | .36 | .00 | .00 | .00 | .00 | .00 | 1.25 | 13.62 | 2.33 | 1.97 | .72 | .00 | .00 | .00 | .00 | .00 | .00 | 19.00 |
| 10- UP | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .72 | 2.51 | 69.00 | 5.02 | .54 | .00 | .00 | .00 | .00 | .00 | .00 | 77.42 |
| TOTAL | .00 | .36 | .00 | .18 | .00 | .00 | .00 | 1.97 | 16.31 | 71.68 | 7.35 | 1.79 | .00 | .00 | .00 | .00 | .00 | .00 | 98.03 |

TABLE 5.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF MAY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | 25- UP | | 25- UP | | ZERO CROSS | | TOTAL | | | | | | |
|-----------------|--------|-------------------------|----------|--------------|----------|-----------------|-------|-----------|--------|----------------------|----------|-------------|-------------|--------|------------|--------|--------|------------|----------|----------|----------|-------------|--------|------------|-------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | PERCENTAGES | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | PERCENTAGES | 25- UP | ZERO CROSS | TOTAL | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .54 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | .00 | .00 | .00 | .906 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .8835 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | 1.00 | .00 | .00 | .00 | .00 | .00 | .54 | .00 | .00 | 1.00 | .00 | .00 | .00 | .00 | .00 | .54 | .00 | .00 | .00 | 98.75 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF MAY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | 25- UP | | 25- UP | | ZERO CROSS | | TOTAL | | | | | | |
|-----------------|--------|-------------------------|----------|--------------|----------|-----------------|-------|-----------|--------|----------------------|----------|-------------|-------------|--------|------------|--------|--------|------------|----------|----------|----------|-------------|--------|------------|-------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | PERCENTAGES | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | PERCENTAGES | 25- UP | ZERO CROSS | TOTAL | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .72 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | .00 | .00 | .00 | 14.52 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | 83.51 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | 1.00 | .00 | .00 | .00 | .00 | .00 | .54 | .00 | .00 | 1.00 | .00 | .00 | .00 | .00 | .00 | .54 | .00 | .00 | .00 | 98.75 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF MAY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | 25- UP | | 25- UP | | ZERO CROSS | | TOTAL | | | | | | |
|-----------------|--------|-------------------------|----------|--------------|----------|-----------------|-------|-----------|--------|----------------------|----------|-------------|-------------|--------|------------|--------|--------|------------|----------|----------|----------|-------------|--------|------------|-------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | PERCENTAGES | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | PERCENTAGES | 25- UP | ZERO CROSS | TOTAL | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | 1.61 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | .00 | .00 | .00 | 16.67 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | 80.29 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | 1.25 | .00 | .00 | .00 | .00 | .00 | .54 | .00 | .00 | 1.25 | .00 | .00 | .00 | .00 | .00 | .54 | .00 | .00 | .00 | 98.57 |

TABLE 5.3. (Concluded)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
|-----------------|--------|--------------------------|----------|----------|----------|--------|--------------------------|-------|--------|--------|----------|----------|----------|--------|------------|-------|
| MONTH OF MAY | | NUMBER OBS. 558 | | | | | NUMBER OBS. 558 | | | | | | | | | |
| HOUR 21 | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .90 | .18 | .00 | .00 | .00 | .00 | .00 | 1.08 | 9.32 | .90 | .00 | .00 | .00 | .00 | 1.08 | 11.47 |
| 5 TO 9 | .00 | .36 | .00 | .00 | .00 | .00 | .00 | .54 | 37.81 | 3.58 | .36 | .00 | .00 | .00 | .72 | 42.83 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | 1.61 | 38.71 | 2.69 | .00 | .00 | .00 | .00 | 43.01 |
| TOTAL | .90 | .36 | .00 | .00 | .00 | .00 | .00 | 1.97 | 48.75 | 43.19 | 3.05 | .00 | .00 | .00 | 1.79 | 97.31 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
| MONTH OF MAY | | NUMBER OBS. 558 | | | | | NUMBER OBS. 558 | | | | | | | | | |
| HOUR 22 | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 1.43 | .18 | .00 | .00 | .00 | .00 | .00 | 1.61 | 12.01 | 1.08 | .00 | .00 | .00 | .00 | .90 | 13.98 |
| 5 TO 9 | .00 | .72 | .36 | .00 | .00 | .00 | .00 | 1.08 | 38.53 | 3.41 | .18 | .00 | .00 | .00 | 2.35 | 44.27 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | 2.51 | 32.44 | 2.33 | .18 | .00 | .00 | .36 | 37.81 |
| TOTAL | 1.43 | .90 | .00 | .00 | .00 | .00 | .00 | 2.87 | 53.05 | 36.92 | 2.51 | .18 | .00 | .00 | 3.61 | 96.06 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
| MONTH OF MAY | | NUMBER OBS. 558 | | | | | NUMBER OBS. 558 | | | | | | | | | |
| HOUR 23 | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .72 | .00 | .00 | .00 | .00 | .00 | .00 | .72 | 12.01 | 1.25 | .00 | .00 | .00 | .00 | 1.61 | 14.87 |
| 5 TO 9 | .00 | .36 | .18 | .00 | .00 | .00 | .00 | .72 | 42.11 | 3.58 | .54 | .18 | .00 | .00 | 1.25 | 47.67 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .54 | 1.97 | 29.57 | 2.69 | .00 | .00 | .00 | .18 | 34.41 |
| TOTAL | .72 | .36 | .18 | .00 | .00 | .00 | .00 | 1.97 | 56.09 | 34.41 | 3.23 | .18 | .00 | .00 | 3.05 | 96.95 |

TABLE 5.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| MRS | KSC-PEAK WINDS | | | | KSC-PEAK WINDS | | | | | |
|-------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------|------|
| | MONTH OF MAY | | | | MONTH OF MAY | | | | | |
| | *** RUNWAY 15 *** | *** RUNWAY 33 *** | *** RUNWAY 33 *** | *** RUNWAY 33 *** | *** RUNWAY 15 *** | *** RUNWAY 33 *** | *** RUNWAY 33 *** | *** RUNWAY 33 *** | | |
| | GIVEN A | GIVEN A | GIVEN A | GIVEN A | GIVEN A | GIVEN A | GIVEN A | GIVEN A | | |
| | HEAD-WIND | TAIL-WIND | HEAD-WIND | TAIL-WIND | HEAD-WIND | TAIL-WIND | HEAD-WIND | TAIL-WIND | | |
| | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | | |
| | REVERSALS | REVERSALS | REVERSALS | REVERSALS | REVERSALS | REVERSALS | REVERSALS | REVERSALS | | |
| | TOTAL | HEAD-TAIL | TAIL-HEAD | TO HEAD | TOTAL | HEAD-TAIL | TAIL-HEAD | TO HEAD | | |
| 00-02 | 2.75 | 1.56 | 1.20 | 1.60 | 40.00 | 4.07 | 1.68 | 2.39 | 36.84 | 2.51 |
| 03-05 | 4.07 | 2.03 | 2.03 | 2.11 | 57.63 | 6.64 | 3.17 | 3.47 | 54.64 | 3.68 |
| 06-08 | 4.91 | 2.33 | 2.57 | 2.44 | 60.56 | 6.34 | 3.71 | 2.63 | 63.27 | 2.80 |
| 09-11 | 3.53 | 1.50 | 2.03 | 1.54 | 79.07 | 3.83 | 2.21 | 1.62 | 88.43 | 1.66 |
| 12-14 | 1.08 | .48 | .60 | .49 | 43.48 | 1.56 | .84 | .72 | 50.00 | .73 |
| 15-17 | 1.56 | .84 | .72 | .85 | 63.16 | 1.80 | .84 | .96 | 63.64 | .97 |
| 18-20 | 1.74 | .96 | .78 | .98 | 39.39 | 1.92 | .78 | 1.14 | 34.21 | 1.16 |
| 21-23 | 2.07 | 1.56 | 1.32 | 1.59 | 57.89 | 4.81 | 1.66 | 2.15 | 57.41 | 2.23 |
| 00-23 | 2.81 | 1.41 | 1.41 | 1.44 | 55.95 | 3.77 | 1.89 | 1.89 | 54.90 | 1.95 |

5.4A

| MRS | KSC-PEAK WINDS | | | | KSC-PEAK WINDS | | | | | |
|-------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------|------|
| | MONTH OF MAY | | | | MONTH OF MAY | | | | | |
| | *** RUNWAY 15 *** | *** RUNWAY 33 *** | *** RUNWAY 33 *** | *** RUNWAY 33 *** | *** RUNWAY 15 *** | *** RUNWAY 33 *** | *** RUNWAY 33 *** | *** RUNWAY 33 *** | | |
| | GIVEN A | GIVEN A | GIVEN A | GIVEN A | GIVEN A | GIVEN A | GIVEN A | GIVEN A | | |
| | HEAD-WIND | TAIL-WIND | HEAD-WIND | TAIL-WIND | HEAD-WIND | TAIL-WIND | HEAD-WIND | TAIL-WIND | | |
| | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | PERCENTAGE | | |
| | REVERSALS | REVERSALS | REVERSALS | REVERSALS | REVERSALS | REVERSALS | REVERSALS | REVERSALS | | |
| | TOTAL | HEAD-TAIL | TAIL-HEAD | TO HEAD | TOTAL | HEAD-TAIL | TAIL-HEAD | TO HEAD | | |
| 00-02 | 1.05 | .43 | .43 | .12 | 1.60 | 15.79 | 14.97 | 6.58 | 36.84 | b.4B |
| 03-05 | 1.12 | .68 | .31 | .31 | 2.11 | 30.93 | 16.49 | 7.22 | 54.64 | |
| 06-08 | .56 | 1.25 | .62 | .62 | 2.44 | 12.24 | 29.31 | 29.51 | 63.27 | |
| 09-11 | .00 | 1.04 | .49 | .49 | 1.54 | 8.70 | 2.17 | 69.57 | 80.43 | |
| 12-14 | .00 | .12 | .36 | .36 | .49 | 3.57 | .00 | 46.43 | 50.00 | |
| 15-17 | .00 | .30 | .54 | .54 | .85 | 18.16 | 13.64 | 31.82 | 63.64 | |
| 18-20 | .49 | .31 | .18 | .18 | .98 | 7.89 | 13.16 | 13.16 | 34.21 | |
| 21-23 | .73 | .49 | .37 | .37 | 1.59 | 20.37 | 33.33 | 3.70 | 57.41 | |
| 00-23 | .49 | .58 | .38 | .38 | 1.44 | 16.78 | 17.21 | 20.92 | 54.90 | |

b.4B

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JUNE

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TABLE 6.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| RUNWAY | MSC YEAR WINDS MONTH OF JUNE CROSSWINDS | | | | | | | | | | TOTAL NUMBER OBS. |
|--------|---|--------|----------|----------|----------|----------|----------------|--|--|--|-------------------|
| | CROSSWIND | | | | | | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | ZERO CROSSWIND | | | | |
| 10-12 | 66.01 | 22.27 | 4.53 | .56 | .20 | .06 | 7.66 | | | | 1618 |
| 03-05 | 70.25 | 15.67 | 4.22 | .74 | .25 | .06 | 10.86 | | | | 1620 |
| 04-08 | 60.68 | 26.77 | 3.02 | .57 | .37 | .12 | 6.54 | | | | 1620 |
| 11-11 | 34.65 | 57.44 | 5.31 | .80 | .45 | .31 | 1.24 | | | | 1619 |
| 17-14 | 14.57 | 73.64 | 9.44 | 1.36 | .66 | .31 | .82 | | | | 1622 |
| 11-17 | 19.63 | 66.46 | 1.45 | 1.71 | .47 | .37 | .86 | | | | 1622 |
| 19-20 | 44.94 | 46.48 | 4.20 | 1.05 | .06 | .12 | 3.15 | | | | 1620 |
| 21-23 | 62.28 | 27.59 | 1.79 | .79 | .17 | .06 | 7.26 | | | | 1620 |
| 17-21 | 46.72 | 42.29 | 4.05 | .97 | .11 | .18 | 4.78 | | | | 12957 |

TABLE 6.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY | MSC YEAR WINDS MONTH OF JUNE TAILWINDS | | | | | | | | | |
|--------|--|--------|----------|-------------|-------|-------|--------------------------|--|--|-------------------|
| | TAILWIND | | | | | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 ABOVE | PERCENTAGES | | | CRITICAL LIMITS IN KNOTS | | | TOTAL NUMBER OBS. |
| 10-12 | 2.35 | .00 | .00 | 37.31 | 41.76 | 21.14 | | | | 1618 |
| 03-05 | 2.96 | .06 | .00 | 38.95 | 37.72 | 15.74 | | | | 1620 |
| 04-08 | 3.09 | .37 | .00 | 27.90 | 44.75 | 26.76 | | | | 1620 |
| 09-11 | .45 | 1.11 | .00 | 3.52 | 36.13 | 58.00 | | | | 1615 |
| 12-14 | .06 | .56 | .12 | .83 | 18.02 | 80.43 | | | | 1620 |
| 17-17 | .56 | .62 | .43 | 1.67 | 22.53 | 73.83 | | | | 1620 |
| 16-20 | .97 | .43 | .00 | 11.48 | 39.94 | 46.23 | | | | 1620 |
| 21-23 | 1.85 | .15 | .00 | 24.14 | 45.86 | 26.75 | | | | 1620 |
| C-23 | 1.54 | .42 | .07 | 17.05 | 35.90 | 43.47 | | | | 12957 |

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TABLE 6.3. (Continued)

| KSC PEAK WINDS | | | | | | | | | | | |
|-------------------------|--------|----------|------------------|--------|----------|-------------|--------|----------|------------|--------|--------|
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
| MONTH OF JUNE | | | | | | | | | | | |
| HOUR 3 | | | NUMBER OBS. 540 | | | RUNWAY 33 | | | ZERO CROSS | | |
| TAILWIND LIMITS | | | CROSSWIND LIMITS | | | PERCENTAGES | | | TOTAL | | |
| 1 TO 4 | 5 TO 9 | 10 TO 15 | 1 TO 4 | 5 TO 9 | 10 TO 15 | 1 TO 4 | 5 TO 9 | 10 TO 15 | 25- UP | 25- UP | 25- UP |
| 1.30 | .19 | .00 | 1.48 | 2.70 | 2.04 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .56 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | 13.89 | 1.30 | .19 | .00 | .00 | .00 | .00 |
| 1.30 | .19 | .00 | 1.48 | 6.26 | 16.48 | 1.85 | .93 | .00 | .00 | .00 | .00 |
| KSC PEAK WINDS | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
| MONTH OF JUNE | | | | | | | | | | | |
| HOUR 4 | | | NUMBER OBS. 540 | | | RUNWAY 33 | | | ZERO CROSS | | |
| TAILWIND LIMITS | | | CROSSWIND LIMITS | | | PERCENTAGES | | | TOTAL | | |
| 1 TO 4 | 5 TO 9 | 10 TO 15 | 1 TO 4 | 5 TO 9 | 10 TO 15 | 1 TO 4 | 5 TO 9 | 10 TO 15 | 25- UP | 25- UP | 25- UP |
| 2.59 | .74 | .00 | 3.70 | 31.30 | 2.41 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .56 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | 1.30 | 12.04 | 1.67 | .37 | .00 | .00 | .00 | .00 |
| 2.59 | .93 | .00 | 3.89 | 68.89 | 15.00 | 2.22 | .56 | .00 | .00 | .00 | .00 |
| KSC PEAK WINDS | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
| MONTH OF JUNE | | | | | | | | | | | |
| HOUR 5 | | | NUMBER OBS. 540 | | | RUNWAY 33 | | | ZERO CROSS | | |
| TAILWIND LIMITS | | | CROSSWIND LIMITS | | | PERCENTAGES | | | TOTAL | | |
| 1 TO 4 | 5 TO 9 | 10 TO 15 | 1 TO 4 | 5 TO 9 | 10 TO 15 | 1 TO 4 | 5 TO 9 | 10 TO 15 | 25- UP | 25- UP | 25- UP |
| 3.52 | .19 | .00 | 3.70 | 33.52 | 2.96 | .19 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | 30.74 | .74 | .37 | .56 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .93 | 10.37 | 2.04 | .19 | .00 | .00 | .00 | .00 |
| 3.52 | .19 | .00 | 3.70 | 65.19 | 14.07 | 2.59 | .74 | .00 | .00 | .00 | .00 |

TABLE 6.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | |
|-----------------|---|--------------------------|-------|--------|--------|--------|--------|--------|--------|------|-------|
| MONTH OF JUNE | | MONTH OF JUNE | | | | | | | | | |
| HOUR 6 | | NUMBER OBS. 540 | | | | | | | | | |
| HOUR 7 | | NUMBER OBS. 540 | | | | | | | | | |
| HOUR 8 | | NUMBER OBS. 540 | | | | | | | | | |
| RUNWAY 15 | | | | | | | | | | | |
| TAILWIND LIMITS | *** CROSSWIND LIMITS *** | *** CROSSWIND LIMITS *** | | | | | | | | | |
| 1 TO 4 | 1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP | ZERO | TOTAL | 1 TO 4 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | ZERO | TOTAL |
| 5 TO 9 | 1.30 | .00 | 5.00 | 29.81 | 3.15 | .00 | .00 | .00 | .00 | .00 | 5.19 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.22 |
| TOTAL | 3.70 | .00 | 5.19 | 60.56 | 17.81 | 2.04 | .37 | .56 | .00 | .00 | 7.59 |
| PERCENTAGES | | | | | | | | | | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .19 | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .37 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 3.70 | .00 | 5.19 | 60.56 | 17.81 | 2.04 | .37 | .56 | .00 | .00 | 7.59 |
| RUNWAY 33 | | | | | | | | | | | |
| TAILWIND LIMITS | *** CROSSWIND LIMITS *** | *** CROSSWIND LIMITS *** | | | | | | | | | |
| 1 TO 4 | 1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP | ZERO | TOTAL | 1 TO 4 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | ZERO | TOTAL |
| 5 TO 9 | 1.67 | .00 | 3.52 | 15.37 | 4.07 | .19 | .00 | .00 | .00 | .93 | 20.56 |
| 10- UP | .00 | .00 | .19 | .00 | 1.30 | .00 | .00 | .00 | .00 | 1.67 | 48.89 |
| TOTAL | 1.67 | .00 | 3.70 | 61.48 | 26.48 | 3.52 | .37 | .19 | .00 | .37 | 25.56 |
| PERCENTAGES | | | | | | | | | | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .19 | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .37 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.67 | .00 | 3.70 | 61.48 | 26.48 | 3.52 | .37 | .19 | .00 | .37 | 25.56 |
| RUNWAY 33 | | | | | | | | | | | |
| TAILWIND LIMITS | *** CROSSWIND LIMITS *** | *** CROSSWIND LIMITS *** | | | | | | | | | |
| 1 TO 4 | 1 TO 4 5 TO 9 10T014 15T019 20T024 25- UP | ZERO | TOTAL | 1 TO 4 | 5 TO 9 | 10T014 | 15T019 | 20T024 | 25- UP | ZERO | TOTAL |
| 5 TO 9 | .56 | .00 | .74 | 4.81 | 4.63 | .37 | .00 | .00 | .00 | .00 | 10.00 |
| 10- UP | .00 | .00 | .00 | .00 | 1.67 | 1.11 | .56 | .00 | .00 | 1.30 | 51.48 |
| TOTAL | .56 | .00 | 1.44 | 54.26 | 37.59 | 3.52 | .93 | .37 | .00 | 1.78 | 98.52 |
| PERCENTAGES | | | | | | | | | | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .56 | .00 | .56 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .37 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .56 | .00 | 1.44 | 54.26 | 37.59 | 3.52 | .93 | .37 | .00 | 1.78 | 98.52 |

TABLE 6.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
|--------------------------|--------|--------------------------|----------|----------|----------|--------|--------------------------|--------|--------|----------|----------|----------|--------|------------|-------|
| MONTH OF JUNE | | MONTH OF JUNE | | | | | | | | | | | | | |
| HOUR 12 | | NUMBER OBS. 540 | | | | | | | | | | | | | |
| RUNWAY 15 | | RUNWAY 33 | | | | | RUNWAY 33 | | | | | | | | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | |
| PERCENTAGES | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .19 | .19 | .19 | .19 | .00 | .00 | .00 | .56 |
| 5 TO 9 | .00 | .37 | .14 | .37 | .00 | .00 | .00 | .15 | .37 | .37 | .56 | .00 | .00 | .00 | 20.56 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .74 | 67.41 | 8.52 | .56 | .00 | .00 | .19 | 77.41 |
| TOTAL | .19 | .37 | .19 | .37 | .00 | .00 | 1.11 | 16.30 | 71.30 | 9.63 | 1.11 | .00 | .00 | .19 | 98.52 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF JUNE | | MONTH OF JUNE | | | | | | | | | | | | | |
| HOUR 13 | | NUMBER OBS. 540 | | | | | | | | | | | | | |
| RUNWAY 15 | | RUNWAY 33 | | | | | RUNWAY 33 | | | | | | | | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | |
| PERCENTAGES | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .19 |
| 5 TO 9 | .00 | .19 | .00 | .19 | .00 | .00 | .00 | 12.96 | 2.96 | .74 | .37 | .00 | .00 | .00 | 17.22 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.11 | 72.41 | 7.59 | .37 | .19 | .00 | .37 | 82.08 |
| TOTAL | .00 | .19 | .00 | .19 | .00 | .00 | .37 | 14.07 | 75.37 | 8.33 | .93 | .19 | .00 | .19 | 99.88 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF JUNE | | MONTH OF JUNE | | | | | | | | | | | | | |
| HOUR 14 | | NUMBER OBS. 540 | | | | | | | | | | | | | |
| RUNWAY 15 | | RUNWAY 33 | | | | | RUNWAY 33 | | | | | | | | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | |
| PERCENTAGES | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .56 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 12.22 | 3.85 | .19 | .37 | .00 | .00 | .37 | 16.30 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .74 | 70.37 | 9.81 | .56 | .00 | .00 | .37 | 81.85 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .74 | 13.15 | 73.70 | 10.00 | 1.11 | .00 | .00 | .37 | 98.70 |

TABLE 6.3. (Continued)

MSC PEAK WINDS MONTH OF JUNE TAILWINDS VS CROSSWINDS

| TAILWIND LIMITS | HOUR 18 | | | | HOUR 19 | | | | HOUR 20 | | | | TOTAL |
|---|---------|--------|----------|----------|---------|--------|----------|----------|---------|--------|----------|----------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | |
| 1 TO 4 | .37 | .74 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .37 | .93 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| RUNWAY 15 CROSSWIND LIMITS PERCENTAGES 1 TO 4 5 TO 9 10 TO 14 15 TO 19 | | | | | | | | | | | | | 33 |
| RUNWAY 33 CROSSWIND LIMITS PERCENTAGES 1 TO 4 5 TO 9 10 TO 14 15 TO 19 | | | | | | | | | | | | | 19 |

MSC PEAK WINDS MONTH OF JUNE TAILWINDS VS CROSSWINDS

| TAILWIND LIMITS | HOUR 19 | | | | HOUR 20 | | | | TOTAL |
|---|---------|--------|----------|----------|---------|--------|----------|----------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | |
| 1 TO 4 | .37 | .37 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .37 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .37 | .74 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| RUNWAY 15 CROSSWIND LIMITS PERCENTAGES 1 TO 4 5 TO 9 10 TO 14 15 TO 19 | | | | | | | | | 33 |
| RUNWAY 33 CROSSWIND LIMITS PERCENTAGES 1 TO 4 5 TO 9 10 TO 14 15 TO 19 | | | | | | | | | 93 |

MSC PEAK WINDS MONTH OF JUNE TAILWINDS VS CROSSWINDS

| TAILWIND LIMITS | HOUR 20 | | | | HOUR 21 | | | | TOTAL |
|---|---------|--------|----------|----------|---------|--------|----------|----------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | |
| 1 TO 4 | .37 | .56 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .37 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .37 | .93 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| RUNWAY 15 CROSSWIND LIMITS PERCENTAGES 1 TO 4 5 TO 9 10 TO 14 15 TO 19 | | | | | | | | | 33 |
| RUNWAY 33 CROSSWIND LIMITS PERCENTAGES 1 TO 4 5 TO 9 10 TO 14 15 TO 19 | | | | | | | | | 56 |

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TABLE 6.3. (Concluded)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JUNE | | NUMBER OBS. | | 540 | | | |
|------------------|--------|-------------------------|--------|------------------|--------|------------------|--------|------------------|--------|------------------|--------|
| HOUR 21 | | HOUR 22 | | HOUR 23 | | HOUR 21 | | HOUR 22 | | HOUR 23 | |
| TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | |
| 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| RUNWAY 15 | | RUNWAY 15 | | RUNWAY 15 | | RUNWAY 15 | | RUNWAY 15 | | RUNWAY 15 | |
| CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | |
| 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| 25-UP | | 25-UP | | 25-UP | | 25-UP | | 25-UP | | 25-UP | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1.56 | .56 | 1.11 | 19.81 | 1.30 | .00 | .00 | .00 | .00 | .00 | 2.04 | 23.15 |
| .00 | .00 | .00 | 37.78 | 3.33 | .19 | .93 | .00 | .00 | .00 | 1.67 | 43.89 |
| .00 | .00 | .00 | 1.85 | 26.10 | 1.11 | .74 | .00 | .00 | .00 | .56 | 30.56 |
| 1.56 | .56 | 1.11 | 59.44 | 30.93 | 1.30 | 1.67 | .00 | .00 | .00 | 4.26 | 97.59 |
| KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | |
| HOUR 22 | | HOUR 23 | | HOUR 21 | | HOUR 22 | | HOUR 23 | | HOUR 21 | |
| TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | |
| 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | |
| CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | |
| 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| 25-UP | | 25-UP | | 25-UP | | 25-UP | | 25-UP | | 25-UP | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1.67 | .19 | 1.25 | 20.93 | 1.67 | .37 | .00 | .00 | .00 | .00 | 1.48 | 24.44 |
| .00 | .37 | .00 | 38.52 | 3.15 | .19 | .57 | .00 | .00 | .00 | 3.52 | 65.74 |
| .00 | .00 | .00 | 2.04 | 21.48 | 1.67 | .37 | .00 | .00 | .00 | .00 | 25.56 |
| 1.67 | .56 | 2.22 | 61.48 | 26.30 | 2.22 | .74 | .00 | .00 | .00 | 5.00 | 95.74 |
| KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | | KSC PEAK WINDS | |
| HOUR 23 | | HOUR 21 | | HOUR 22 | | HOUR 23 | | HOUR 21 | | HOUR 22 | |
| TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | |
| 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | | RUNWAY 33 | |
| CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | |
| 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 | 15T019 | 20T024 |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | |
| 25-UP | | 25-UP | | 25-UP | | 25-UP | | 25-UP | | 25-UP | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1.85 | .56 | 2.59 | 20.19 | 1.85 | .37 | .00 | .00 | .00 | .00 | 2.41 | 24.81 |
| .00 | .19 | .19 | 40.37 | 2.96 | .19 | .37 | .00 | .00 | .00 | 4.07 | 47.96 |
| .00 | .00 | .00 | 1.30 | 18.69 | 1.30 | .19 | .00 | .00 | .00 | .19 | 22.04 |
| 1.85 | .74 | 2.78 | 61.85 | 23.70 | 1.85 | .56 | .00 | .00 | .00 | 6.67 | 94.81 |

TABLE 6.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| HRS | MSE PEAK WINDS | | | | HEAD/TAIL WIND REVERSALS | | | | | |
|-------|----------------|------|---------------|------|--------------------------|------|---------------|------|-------|------|
| | MONTH OF JUNE | | MONTH OF JUNE | | MONTH OF JUNE | | MONTH OF JUNE | | | |
| 00-02 | 3.03 | 1.36 | 1.67 | 1.39 | 71.05 | 5.94 | 2.60 | 3.34 | 68.05 | 3.47 |
| 03-05 | 5.07 | 3.15 | 1.92 | 3.25 | 63.27 | 9.52 | 3.77 | 5.75 | 49.59 | 6.22 |
| 06-08 | 4.27 | 1.61 | 2.66 | 1.67 | 76.79 | 6.74 | 4.95 | 1.79 | 82.47 | 1.91 |
| 09-11 | 2.16 | .93 | 1.24 | .94 | 76.92 | 2.41 | 1.30 | 1.11 | 70.00 | 1.13 |
| 12-14 | 1.11 | .56 | .56 | .56 | 75.00 | 1.36 | .68 | .68 | 61.11 | .69 |
| 15-17 | 2.54 | 1.36 | 1.18 | 1.38 | 73.08 | 2.72 | 1.24 | 1.48 | 62.50 | 1.51 |
| 18-20 | 1.92 | .87 | 1.05 | .88 | 77.27 | 7.03 | 1.48 | 1.55 | 63.16 | 1.58 |
| 21-23 | 2.78 | 1.61 | 1.18 | 1.64 | 57.58 | 5.39 | 2.54 | 2.84 | 64.06 | 2.96 |
| 24-27 | 2.86 | 1.43 | 1.43 | 1.46 | 70.61 | 4.64 | 2.32 | 2.32 | 64.79 | 2.41 |

6.4A

MSE PEAK WINDS MONTH OF JUNE HEADWIND TO TAILWIND REVERSALS

| HRS | MSE PEAK WINDS | | | | HEADWIND TO TAILWIND REVERSALS | | | |
|-------|----------------|-----|---------------|------|--------------------------------|-------|---------------|-------|
| | MONTH OF JUNE | | MONTH OF JUNE | | MONTH OF JUNE | | MONTH OF JUNE | |
| 00-02 | 1.14 | .25 | .00 | 1.39 | 36.07 | 24.59 | 8.20 | 68.85 |
| 03-05 | 2.93 | .32 | .00 | 3.25 | 32.52 | 17.07 | .00 | 49.59 |
| 06-08 | .83 | .77 | .06 | 1.67 | 24.74 | 46.39 | 11.34 | 82.47 |
| 09-11 | .13 | .63 | .19 | .94 | 10.00 | 10.00 | 50.00 | 70.00 |
| 12-14 | .00 | .25 | .31 | .56 | 11.11 | 11.11 | 38.89 | 61.11 |
| 15-17 | .38 | .69 | .31 | 1.38 | 6.25 | 25.00 | 31.25 | 62.50 |
| 18-20 | .69 | .19 | .00 | .88 | 28.95 | 31.58 | 2.63 | 63.16 |
| 21-23 | 1.26 | .38 | .00 | 1.64 | 34.38 | 28.13 | 1.56 | 64.06 |
| 24-27 | .92 | .43 | .11 | 1.46 | 27.21 | 26.78 | 10.60 | 64.79 |

6.4B

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TABLE 6.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY CLASS (INDICATOR) | MAY PEAK WINDS | | | HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF JUNE | | | MAY RUNWAY 15 000 | | | MAY RUNWAY 33 000 | | |
|--------------------------------|-----------------------|-----------------------|-----------------------|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|
| | HOURS 06-08 CPF | HOURS 09-11 CPF | HOURS 12-14 CPF | HOURS 06-17 CPF | HOURS 08-09 CPF | HOURS 12-14 CPF | HOURS 09-11 CPF | HOURS 12-14 CPF | HOURS 15-17 CPF | HOURS 18-20 CPF | HOURS 21-24 CPF | |
| | HOURS 06-08 CPF | HOURS 09-11 CPF | HOURS 12-14 CPF | HOURS 06-17 CPF | HOURS 08-09 CPF | HOURS 12-14 CPF | HOURS 09-11 CPF | HOURS 12-14 CPF | HOURS 15-17 CPF | HOURS 18-20 CPF | HOURS 21-24 CPF | |
| 1-1 | 9.99 | 1.19 | .89 | 1.76 | 0 | 92.27 | 13.33 | 33.33 | 18.75 | 32.20 | | |
| 1-2 | 7.10 | 2.01 | .67 | 2.56 | 0 | 53.61 | 13.33 | 33.33 | 18.75 | 32.20 | | |
| 1-3 | 12.40 | 2.26 | .82 | 3.98 | 0 | 76.29 | 20.00 | 33.33 | 21.00 | 52.54 | | |
| 1-4 | 20.00 | 2.95 | .68 | 6.15 | 0 | 85.57 | 30.00 | 33.33 | 34.38 | 61.58 | | |
| 1-5 | 26.30 | 3.63 | .81 | 8.16 | 0 | 93.81 | 40.00 | 38.89 | 46.88 | 70.62 | | |
| 1-6 | 37.92 | 6.65 | 1.00 | 12.30 | 0 | 96.85 | 43.33 | 44.44 | 56.25 | 77.80 | | |
| 1-7 | 45.52 | 9.62 | 2.36 | 15.06 | 0 | 96.91 | 73.33 | 44.44 | 62.50 | 81.36 | | |
| 1-8 | 58.03 | 14.12 | 3.92 | 19.97 | 0 | 97.94 | 83.00 | 51.11 | 65.63 | 85.31 | | |
| 1-9 | 61.06 | 21.28 | 6.90 | 25.11 | 0 | 98.97 | 90.00 | 66.67 | 75.00 | 89.83 | | |
| 1-10 | 72.70 | 41.05 | 18.97 | 39.22 | 0 | 100.00 | 100.00 | 80.89 | 78.13 | 94.92 | | |
| 1-11 | 83.18 | 63.87 | 31.17 | 57.57 | 0 | 0 | 0 | 88.89 | 81.25 | 95.48 | | |
| 1-12 | 87.66 | 73.89 | 55.25 | 67.87 | 0 | 0 | 0 | 88.89 | 87.50 | 96.61 | | |
| 1-13 | 90.09 | 79.91 | 64.86 | 73.97 | 0 | 0 | 0 | 88.89 | 90.63 | 97.14 | | |
| 1-14 | 92.14 | 84.59 | 74.19 | 80.56 | 0 | 0 | 0 | 88.89 | 92.63 | 97.74 | | |
| 1-15 | 93.93 | 88.26 | 81.04 | 84.89 | 0 | 0 | 0 | 88.89 | 93.75 | 98.31 | | |
| 1-16 | 95.20 | 91.07 | 84.51 | 88.16 | 0 | 0 | 0 | 88.89 | 93.75 | 98.31 | | |
| 1-17 | 96.20 | 92.72 | 86.69 | 90.30 | 0 | 0 | 0 | 88.89 | 94.44 | 98.44 | | |
| 1-18 | 96.99 | 95.21 | 90.86 | 92.97 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-19 | 97.87 | 97.11 | 94.22 | 95.50 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-20 | 98.48 | 97.55 | 95.21 | 96.29 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-21 | 98.27 | 98.05 | 96.33 | 97.06 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-22 | 98.87 | 98.31 | 96.83 | 97.47 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-23 | 98.87 | 98.87 | 97.64 | 98.10 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-24 | 99.17 | 96.67 | 96.13 | 98.44 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-25 | 99.49 | 99.12 | 98.37 | 98.88 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-26 | 99.62 | 99.37 | 98.51 | 98.95 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-27 | 99.68 | 99.56 | 98.94 | 99.17 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-28 | 99.68 | 99.56 | 98.94 | 99.25 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-29 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-30 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-31 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-32 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-33 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-34 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-35 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-36 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-37 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-38 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-39 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-40 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-41 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-42 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-43 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-44 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-45 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-46 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-47 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-48 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-49 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| 1-50 | 99.68 | 99.56 | 98.94 | 99.31 | 0 | 0 | 0 | 88.89 | 95.44 | 98.44 | | |
| NO-1 | 100.00 | 100.00 | 100.00 | 100.00 | 0 | 0 | 0 | 100.00 | 100.00 | 100.00 | | |
| NO-2 | 1564 | 1593 | 1608 | 6359 | 0 | 97 | 31 | 18 | 32 | 177 | | |

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JULY

¹⁰⁰
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TABLE 7.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| RUNWAY | KSC PEAK WINDS MONTH OF JULY | | | | | | | | | | TOTAL NUMBER ORS. | |
|--------|------------------------------|--------|----------|----------|----------|----------|--------|--------|----------|----------|-------------------|----------|
| | CROSSWIND | | | | | ZEPH | | | | | | |
| MRS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE |
| 17-02 | 71.80 | 13.98 | .60 | .18 | .00 | .00 | 13.44 | | | | | |
| 17-05 | 73.78 | 10.39 | .24 | .24 | .00 | .00 | 15.35 | | | | | |
| 16-08 | 64.73 | 21.28 | 2.15 | .24 | .00 | .00 | 11.67 | | | | | |
| 15-11 | 41.60 | 50.75 | 4.84 | .42 | .00 | .00 | 2.39 | | | | | |
| 12-14 | 16.79 | 74.13 | 7.35 | .96 | .06 | .05 | .66 | | | | | |
| 15-17 | 18.76 | 69.65 | 9.08 | 1.19 | .24 | .18 | .90 | | | | | |
| 15-20 | 51.97 | 45.26 | .87 | .36 | .17 | .00 | 4.42 | | | | | |
| 21-23 | 70.19 | 19.71 | .64 | .00 | .00 | .12 | 9.14 | | | | | |
| 10-23 | 51.20 | 37.52 | 3.50 | .45 | .05 | .04 | 7.24 | | | | | |

TABLE 7.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| MRS | KSC PEAK WINDS MONTH OF JULY | | | | | | | | | | TOTAL NUMBER ORS. |
|-------|------------------------------|--------|----------|----------|----------|--------------------|--------|----------|----------|----------|-------------------|
| | RUNWAY 15 TAILWIND | | | | | RUNWAY 33 TAILWIND | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 ABOVE | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 ABOVE | |
| 17-02 | 1.61 | .00 | .00 | .00 | .00 | 34.83 | 47.43 | | | | |
| 17-05 | 1.85 | .00 | .00 | .00 | .00 | 44.74 | 38.59 | | | | |
| 16-08 | 1.91 | .42 | .00 | .00 | .00 | 28.45 | 47.28 | | | | |
| 15-11 | .36 | .42 | .00 | .00 | .00 | 4.60 | 42.98 | | | | |
| 12-14 | .00 | .42 | .24 | .24 | .00 | .90 | 22.40 | | | | |
| 15-17 | .18 | .36 | .24 | .24 | .00 | 2.45 | 22.76 | | | | |
| 15-20 | .66 | .74 | .00 | .00 | .00 | 15.53 | 43.07 | | | | |
| 21-23 | 1.55 | .12 | .00 | .00 | .00 | 28.38 | 49.42 | | | | |
| 10-23 | 1.52 | .31 | .06 | .06 | .06 | 19.99 | 39.29 | | | | |

TABLE 7.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | ZERO CROSS | | TOTAL | | |
|----------------|------|-------------------------|--------|---------------|----------|-----------------|--------|-----------|--------|----------------------|----------|-------------|--------|------------|--------|----------|----------|-------|
| HOUR | C | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | |
| 1 TO 4 | 1.08 | .72 | .00 | .00 | .00 | .00 | .00 | 1.79 | 26.70 | 2.87 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | 33.33 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 41.22 | 1.00 | .34 | .00 | .00 | .00 | .00 | .00 | .00 | 16.59 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.43 | 11.29 | .36 | .18 | .00 | .00 | .00 | .00 | .00 | 13.62 |
| TOTAL | 1.08 | .72 | .00 | .00 | .00 | .00 | .00 | 1.79 | 69.34 | 15.23 | 1.08 | .18 | .00 | .00 | .00 | .00 | .00 | 93.55 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | ZERO CROSS | | TOTAL | | |
| HOUR | 1 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | |
| 1 TO 4 | 1.08 | .18 | .00 | .00 | .00 | .00 | .00 | 1.25 | 25.81 | 2.15 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 31.72 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 44.80 | 1.43 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 51.43 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.43 | 9.50 | .18 | .18 | .00 | .00 | .00 | .00 | .00 | 11.47 |
| TOTAL | 1.08 | .18 | .00 | .00 | .00 | .00 | .00 | 1.25 | 72.04 | 13.08 | .18 | .18 | .00 | .00 | .00 | .00 | .00 | 94.62 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | ZERO CROSS | | TOTAL | | |
| HOUR | 2 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | |
| 1 TO 4 | 1.25 | .18 | .00 | .00 | .00 | .00 | .00 | 1.79 | 32.26 | 2.33 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 39.53 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 37.63 | 1.00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | 44.27 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .72 | 9.14 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | 10.57 |
| TOTAL | 1.25 | .18 | .00 | .00 | .00 | .00 | .00 | 1.79 | 70.61 | 12.54 | .54 | .18 | .00 | .00 | .00 | .00 | .00 | 94.27 |

TABLE 7.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OBS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | 25- UP | | ZERO CROSS | | TOTAL | | |
|----------------|------------|-------------------------|--------|---------------|----------|-----------------|----------|-----------|----------|----------------------|----------|-------------|----------|----------|----------|------------|----------|----------|----------|----------|
| HOUR 3 | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 TO 29 | 30 TO 34 | 35 TO 39 | 40 TO 44 | 45 TO 49 | 50 TO 54 | 55 TO 58 | 59 TO 63 | 64 TO 68 | 69 TO 73 | 74 TO 78 | 79 TO 83 | 84 TO 88 | 89 TO 93 |
| 1-61 | .00 | 1.61 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | 1.61 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OPS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | 25- UP | | ZERO CROSS | | TOTAL | | |
| HOUR 4 | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 TO 29 | 30 TO 34 | 35 TO 39 | 40 TO 44 | 45 TO 49 | 50 TO 54 | 55 TO 58 | 59 TO 63 | 64 TO 68 | 69 TO 73 | 74 TO 78 | 79 TO 83 | 84 TO 88 | 89 TO 93 |
| 1-70 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OPS. 558 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | 25- UP | | ZERO CROSS | | TOTAL | | |
| HOUR 5 | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 TO 29 | 30 TO 34 | 35 TO 39 | 40 TO 44 | 45 TO 49 | 50 TO 54 | 55 TO 58 | 59 TO 63 | 64 TO 68 | 69 TO 73 | 74 TO 78 | 79 TO 83 | 84 TO 88 | 89 TO 93 |
| 1-79 | .00 | 1.79 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | 1.79 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

TABLE 7.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|------|-------------------------|-----|-------------|-----|-------------|-----|-------------|-------|-------------|------|-------------|-----|-------------|------|-------------|-----|-------------|-----|-------------|-----|-------------|------|-------|
| MONTH OF JULY | | MONTH OF JULY | | | | | | | | | | | | | | | | | | | | | | |
| HOUR 6 | | NUMBER OBS. 558 | | | | | | | | | | | | | | | | | | | | | | |
| TAILWIND LIMITS | | RUNWAY 1E | | ZERO CROSS | | 25-UP | | TOTAL | | RUNWAY 33 | | ZERO CROSS | | TOTAL | | | | | | | | | | |
| 1 TO 4 | | 5 TO 9 | | 10 TO 14 | | 15 TO 19 | | 20 TO 24 | | 1 TO 4 | | 5 TO 9 | | 10 TO 14 | | 15 TO 19 | | 20 TO 24 | | 25-UP | | TOTAL | | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | |
| 1 TO 4 | 2.15 | .18 | .00 | .00 | .00 | .00 | .00 | 2.33 | 36.92 | 2.69 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 6.27 | 45.88 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 30.82 | .72 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.15 | 34.85 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .72 | 6.81 | .54 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | 8.42 |
| TOTAL | 2.15 | .18 | .00 | .00 | .00 | .00 | .00 | 2.33 | 68.46 | 10.22 | .90 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 8.60 | 88.35 |
| KSC PEAK WINDS | | | | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF JULY | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF JULY | | | | | | | | | | | | | | | | | | | | | | | | |
| NUMBER OBS. 558 | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWIND LIMITS | | RUNWAY 1E | | ZERO CROSS | | 25-UP | | TOTAL | | RUNWAY 33 | | ZERO CROSS | | TOTAL | | | | | | | | | | |
| 1 TO 4 | 1.61 | .36 | .00 | .00 | .00 | .00 | .00 | 1.97 | 19.89 | 4.30 | .36 | .00 | .00 | .00 | 2.69 | 27.24 | | | | | | | | |
| 5 TO 9 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .36 | 44.27 | 1.61 | 1.25 | .18 | .00 | .00 | 3.58 | 50.90 | | | | | | | | |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | 15.05 | .36 | .00 | .00 | .00 | .18 | 15.95 | | | | | | | | |
| TOTAL | 1.61 | .54 | .00 | .00 | .00 | .00 | .00 | 2.33 | 64.52 | 20.97 | 1.97 | .18 | .00 | .00 | 6.45 | 94.09 | | | | | | | | |
| KSC PEAK WINDS | | | | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF JULY | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF JULY | | | | | | | | | | | | | | | | | | | | | | | | |
| NUMBER OBS. 557 | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWIND LIMITS | | RUNWAY 1E | | ZERO CROSS | | 25-UP | | TOTAL | | RUNWAY 33 | | ZERO CROSS | | TOTAL | | | | | | | | | | |
| 1 TO 4 | .72 | .72 | .00 | .00 | .00 | .00 | .00 | 1.44 | 6.82 | 3.95 | .18 | .00 | .00 | .00 | 1.26 | 12.21 | | | | | | | | |
| 5 TO 9 | .00 | .72 | .00 | .00 | .00 | .00 | .00 | .00 | 48.65 | 1.62 | 2.15 | .18 | .00 | .00 | 4.31 | 56.92 | | | | | | | | |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.24 | 24.96 | 1.09 | .00 | .00 | .00 | .54 | 27.83 | | | | | | | | |
| TOTAL | .72 | 1.44 | .00 | .00 | .00 | .00 | .00 | 2.33 | 56.77 | 30.52 | 3.41 | .18 | .00 | .00 | 6.10 | 96.95 | | | | | | | | |

TABLE 7.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OBS. 557 | | | | | | |
|-----------------|--------|-------------------------|----------|---------------|------------|-----------------|--------|----------|------------|-------|------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 24 | 25- UP | ZERO CROSS | RUNWAY 33 | | | ZERO CROSS | TOTAL | | |
| | | | | | | 1 TO 4 | 5 TO 9 | 10 TO 24 | | | | |
| 1 TO 4 | .18 | .54 | .00 | .00 | .00 | .72 | 3.95 | 2.51 | .77 | .00 | .54 | 7.72 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .72 | 42.55 | 7.59 | 3.05 | .00 | 1.44 | 57.63 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | 34.65 | 1.62 | .18 | .00 | .72 | 39.68 |
| TOTAL | .18 | 1.28 | .00 | .00 | .00 | 1.44 | 49.01 | 40.75 | 5.30 | .18 | 2.69 | 98.02 |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OBS. 558 | | | | | | |
|-----------------|--------|-------------------------|----------|---------------|------------|-----------------|--------|----------|------------|-------|------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 24 | 25- UP | ZERO CROSS | RUNWAY 33 | | | ZERO CROSS | TOTAL | | |
| | | | | | | 1 TO 4 | 5 TO 9 | 10 TO 24 | | | | |
| 1 TO 4 | .00 | .18 | .00 | .00 | .00 | .18 | 2.51 | 1.01 | .18 | .00 | .00 | 4.30 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | 30.53 | 2.15 | 2.15 | .00 | .90 | 44.09 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | 2.87 | 45.88 | 1.43 | .18 | .54 | 50.90 |
| TOTAL | .00 | .18 | .00 | .00 | .00 | .18 | 43.91 | 49.64 | 3.76 | .54 | 1.43 | 99.28 |

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OBS. 558 | | | | | | |
|-----------------|--------|-------------------------|----------|---------------|------------|-----------------|--------|----------|------------|-------|------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 24 | 25- UP | ZERO CROSS | RUNWAY 33 | | | ZERO CROSS | TOTAL | | |
| | | | | | | 1 TO 4 | 5 TO 9 | 10 TO 24 | | | | |
| 1 TO 4 | .00 | .18 | .00 | .00 | .00 | .18 | .54 | .72 | .36 | .00 | .00 | 1.79 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | 28.32 | 3.58 | 1.61 | .00 | .54 | 34.23 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | 2.87 | 55.91 | 2.87 | .18 | .90 | 62.72 |
| TOTAL | .00 | .18 | .00 | .00 | .00 | .18 | 31.77 | 60.22 | 4.84 | .54 | 1.43 | 98.75 |

02

TABLE 7.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | |
|-----------------|-----|--------------------------|--------|----------|----------|----------|--------------------------|------------|-------|--------|--------|-------------|----------|----------|--------|------------|-------|
| MONTH OF JULY | | HOUR 12 | | | | | NUMBER OBS. 558 | | | | | | | | | | |
| | | RUNWAY 33 | | | | | RUNWAY 33 | | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | | |
| TAILWIND LIMITS | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| MI'S | | PERCENTAGES | | | | | PERCENTAGES | | | | | PERCENTAGES | | | | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .16 | .18 | .18 | .00 | .00 | .00 | .00 | .54 |
| 5 TO 9 | .00 | .18 | .54 | .00 | .00 | .00 | .00 | .72 | .72 | 19.89 | 5.73 | 1.25 | .36 | .00 | .00 | .72 | 27.96 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.43 | 65.23 | 3.58 | .00 | .00 | .00 | .00 | 70.25 |
| TOTAL | .00 | .18 | .54 | .00 | .00 | .00 | .00 | .72 | .72 | 21.51 | 71.15 | 5.02 | .36 | .00 | .00 | .72 | 98.75 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | |
| MONTH OF JULY | | HOUR 13 | | | | | NUMBER OBS. 558 | | | | | | | | | | |
| | | RUNWAY 33 | | | | | RUNWAY 33 | | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | | |
| TAILWIND LIMITS | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| MI'S | | PERCENTAGES | | | | | PERCENTAGES | | | | | PERCENTAGES | | | | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | .18 | .18 | .00 | .00 | .00 | .00 | .72 |
| 5 TO 9 | .00 | .70 | .14 | .00 | .00 | .00 | .00 | .18 | .18 | 15.23 | 5.20 | .54 | .36 | .00 | .00 | .18 | 21.51 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.04 | 69.71 | 6.00 | .36 | .00 | .00 | .00 | 77.24 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 16.67 | 75.09 | 6.81 | .72 | .00 | .00 | .18 | 99.46 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | |
| MONTH OF JULY | | HOUR 14 | | | | | NUMBER OBS. 558 | | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 15 | | | | | | | | | | |
| | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | | | | | | |
| TAILWIND LIMITS | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| MI'S | | PERCENTAGES | | | | | PERCENTAGES | | | | | PERCENTAGES | | | | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | .36 | .36 | .18 | .00 | .00 | .18 | 1.43 |
| 5 TO 9 | .00 | .18 | .18 | .00 | .00 | .00 | .00 | .36 | .36 | 11.29 | 4.84 | .16 | 1.00 | .00 | .00 | .36 | 17.74 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .54 | 70.61 | 8.42 | .36 | .18 | .00 | .00 | 80.11 |
| TOTAL | .00 | .18 | .18 | .00 | .00 | .00 | .00 | .72 | .72 | 12.19 | 75.81 | 8.96 | 1.61 | .18 | .00 | .54 | 99.28 |

TABLE 7.3. (Continued)

| ESC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OBS. 558 | | DUNWAY 33 | | CROSSING LIMITS | | PERCENTAGES | | ZERO CROSS | | 25- UP | | TOTAL | |
|-------------------------|-----|-------------------------|-----|---------------|-----|-----------------|-----|---------------|-----|-----------------|-----|---------------|-----|---------------|-----|---------------|-----|---------------|-----|
| MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | |
| 1 TO 4 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-14 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ESC PEAK WINDS | | | | | | | | | | | | | | | | | | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-14 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-14 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

TABLE 7.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF JULY | | NUMBER OBS. 558 | |
|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|
| HOUR 18 | | HOUR 19 | | HOUR 20 | | HOUR 21 | |
| RUNWAY 15 | | RUNWAY 15 | | RUNWAY 15 | | RUNWAY 33 | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | |
| TAILWIND LIMITS | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | TAILWIND LIMITS | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | TAILWIND LIMITS | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | TAILWIND LIMITS | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 1 TO 4 | .18 .36 .00 .00 .00 .00 .00 .00 | 1 TO 4 | .54 .13.26 1.25 .18 .00 .00 .00 | 1 TO 4 | .90 .19.71 7.15 .00 .00 .00 .00 | 1 TO 4 | .54 .30.20 3.94 .36 .00 .00 .00 |
| 5 TO 9 | .00 .18 .00 .00 .00 .00 .00 .00 | 5 TO 9 | .90 .39.07 4.84 .72 .18 .00 .00 | 5 TO 9 | .54 .31.94 2.33 .18 .00 .00 .00 | 5 TO 9 | .00 .90 49.82 4.12 .00 .00 .00 .00 |
| 10-UP | .00 .00 .00 .00 .00 .00 .00 .00 | 10-UP | .00 .00 .00 .00 .00 .00 .00 .00 | 10-UP | .00 .00 .00 .00 .00 .00 .00 .00 | 10-UP | .00 .00 .00 .00 .00 .00 .00 .00 |
| TOTAL | .18 .54 .00 .00 .00 .00 .00 .00 | TOTAL | 1.43 .54.30 58.66 4.08 .54 .00 .00 | TOTAL | 1.43 .54.30 58.66 4.08 .54 .00 .00 | TOTAL | 1.43 .54.30 58.66 4.08 .54 .00 .00 |
| ZERO CROSS | .00 .00 .00 .00 .00 .00 .00 .00 | ZERO CROSS | .00 .00 .00 .00 .00 .00 .00 .00 | ZERO CROSS | .00 .00 .00 .00 .00 .00 .00 .00 | ZERO CROSS | .00 .00 .00 .00 .00 .00 .00 .00 |
| MOSC PEAK WINDS | | MOSC PEAK WINDS | | MOSC PEAK WINDS | | MOSC PEAK WINDS | |
| HOUR 18 | | HOUR 19 | | HOUR 20 | | HOUR 21 | |
| RUNWAY 15 | | RUNWAY 15 | | RUNWAY 15 | | RUNWAY 33 | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | |
| TAILWIND LIMITS | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | TAILWIND LIMITS | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | TAILWIND LIMITS | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | TAILWIND LIMITS | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| 1 TO 4 | .36 .72 .00 .00 .00 .00 .00 .00 | 1 TO 4 | .36 .90 .00 .00 .00 .00 .00 .00 | 1 TO 4 | .72 .18 .00 .00 .00 .00 .00 .00 | 1 TO 4 | .72 .18 .00 .00 .00 .00 .00 .00 |
| 5 TO 9 | .00 .00 .00 .00 .00 .00 .00 .00 | 5 TO 9 | .00 .00 .00 .00 .00 .00 .00 .00 | 5 TO 9 | .00 .00 .00 .00 .00 .00 .00 .00 | 5 TO 9 | .00 .00 .00 .00 .00 .00 .00 .00 |
| 10-UP | .00 .00 .00 .00 .00 .00 .00 .00 | 10-UP | .00 .00 .00 .00 .00 .00 .00 .00 | 10-UP | .00 .00 .00 .00 .00 .00 .00 .00 | 10-UP | .00 .00 .00 .00 .00 .00 .00 .00 |
| TOTAL | .36 .72 .00 .00 .00 .00 .00 .00 | TOTAL | .36 .90 .00 .00 .00 .00 .00 .00 | TOTAL | .72 .18 .00 .00 .00 .00 .00 .00 | TOTAL | .72 .18 .00 .00 .00 .00 .00 .00 |
| ZERO CROSS | .00 .00 .00 .00 .00 .00 .00 .00 | ZERO CROSS | .00 .00 .00 .00 .00 .00 .00 .00 | ZERO CROSS | .00 .00 .00 .00 .00 .00 .00 .00 | ZERO CROSS | .00 .00 .00 .00 .00 .00 .00 .00 |

TABLE 7.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| HOUR | WIND/TAIL WIND REVERSALS | | | | WIND/TAIL WIND REVERSALS | | | | | |
|-------|--------------------------|--------------------------|----------------|--------------------------|--------------------------|--------------------------|----------------|--------------------------|-------|------|
| | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | | |
| | WSE PEAK WINDS | WIND/TAIL WIND REVERSALS | WSE PEAK WINDS | WIND/TAIL WIND REVERSALS | WSE PEAK WINDS | WIND/TAIL WIND REVERSALS | WSE PEAK WINDS | WIND/TAIL WIND REVERSALS | | |
| 00-02 | 2.51 | 1.37 | 1.20 | 1.34 | 74.07 | 4.82 | 3.29 | 3.53 | 56.12 | 3.75 |
| 03-05 | 2.04 | 1.26 | 1.20 | 1.26 | 64.52 | 9.63 | 4.07 | 5.57 | 66.90 | 6.09 |
| 06-08 | 2.64 | 1.20 | 1.50 | 1.27 | 64.10 | 6.22 | 4.73 | 1.50 | 66.70 | 1.61 |
| 09-11 | 1.32 | .54 | .78 | .54 | 170.00 | 1.68 | .96 | .72 | 72.73 | .73 |
| 12-14 | .94 | .42 | .54 | .42 | 81.82 | 1.20 | .72 | .48 | 85.71 | .68 |
| 15-17 | 1.68 | 1.02 | .66 | 1.03 | 84.62 | 2.53 | .90 | 1.44 | 83.33 | 1.45 |
| 18-20 | 2.15 | 1.04 | 1.54 | 1.59 | 75.00 | 3.41 | 1.56 | 1.86 | 68.42 | 1.90 |
| 21-23 | 2.04 | 1.04 | .96 | 1.10 | 57.14 | 4.32 | 2.09 | 3.23 | 51.47 | 3.37 |
| 24-26 | 1.57 | .99 | .74 | 1.00 | 70.97 | 4.58 | 2.29 | 2.29 | 59.07 | 2.38 |

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| HOUR | WIND/TAIL WIND REVERSALS | | | | WIND/TAIL WIND REVERSALS | | | | |
|-------|--------------------------|--------------------------|----------------|--------------------------|--------------------------|--------------------------|----------------|--------------------------|-------|
| | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | MONTH OF JULY | | |
| | WSE PEAK WINDS | WIND/TAIL WIND REVERSALS | WSE PEAK WINDS | WIND/TAIL WIND REVERSALS | WSE PEAK WINDS | WIND/TAIL WIND REVERSALS | WSE PEAK WINDS | WIND/TAIL WIND REVERSALS | |
| 00-02 | 1.18 | .70 | .70 | 1.24 | 1.74 | 34.69 | 21.43 | .02 | 56.12 |
| 03-05 | 1.16 | .12 | .00 | 1.23 | 1.28 | 23.79 | 12.41 | .89 | 66.90 |
| 06-08 | .00 | .31 | .12 | 1.23 | 1.23 | 26.09 | 33.91 | 6.70 | 68.70 |
| 09-11 | .12 | .42 | .77 | .54 | .54 | 13.64 | 22.73 | 36.36 | 72.72 |
| 12-14 | .00 | .30 | .12 | .42 | .42 | 7.14 | 28.57 | 50.00 | 85.71 |
| 15-17 | .18 | .54 | .77 | 1.03 | 1.03 | .00 | 39.09 | 44.44 | 43.33 |
| 18-20 | .55 | .42 | .12 | 1.09 | 1.09 | 15.79 | 28.95 | 23.64 | 68.42 |
| 21-23 | .91 | .18 | .00 | 1.10 | 1.10 | 27.94 | 23.53 | .00 | 51.47 |
| 24-26 | .62 | .74 | .08 | 1.00 | 1.00 | 27.41 | 23.36 | 8.30 | 59.07 |

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TABLE 7.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

| Wind Component 10-15 100-150 | 000 to 15 000 | | | | 000 to 25 000 | | | | 000 to 35 000 | | | | WINDS 10-15 100-150 150-200 200-250 250-300 300-350 350-400 400-450 450-500 500-550 550-600 600-650 650-700 700-750 750-800 800-850 850-900 900-950 950-1000 1000-1050 1050-1100 1100-1150 1150-1200 1200-1250 1250-1300 1300-1350 1350-1400 1400-1450 1450-1500 1500-1550 1550-1600 1600-1650 1650-1700 1700-1750 1750-1800 1800-1850 1850-1900 1900-1950 1950-2000 | | |
|---------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|-------------------------|-------------------------|---|-------------------------|-------------------------|
| | 15-25 CWF | | 25-35 CWF | | 35-45 CWF | | 45-55 CWF | | 55-65 CWF | | 65-75 CWF | | | 75-85 CWF | |
| | WINDS 10-15 CWF | WINDS 15-25 CWF | WINDS 25-35 CWF | WINDS 35-45 CWF | WINDS 45-55 CWF | WINDS 55-65 CWF | WINDS 65-75 CWF | WINDS 75-85 CWF | WINDS 85-95 CWF | WINDS 95-105 CWF | WINDS 105-115 CWF | WINDS 115-125 CWF | | WINDS 125-135 CWF | WINDS 135-145 CWF |
| 1 | 4.34 | 3.87 | 3.41 | 2.94 | 2.48 | 2.02 | 1.55 | 1.09 | 0.62 | 0.15 | 0.00 | 0.00 | 0.00 | | |
| 2 | 6.75 | 6.27 | 5.80 | 5.32 | 4.85 | 4.38 | 3.91 | 3.44 | 2.97 | 2.50 | 2.03 | 1.56 | 1.09 | | |
| 3 | 10.25 | 9.77 | 9.30 | 8.82 | 8.35 | 7.88 | 7.41 | 6.94 | 6.47 | 6.00 | 5.53 | 5.06 | 4.59 | | |
| 4 | 14.00 | 13.52 | 13.04 | 12.56 | 12.08 | 11.60 | 11.12 | 10.64 | 10.16 | 9.68 | 9.20 | 8.72 | 8.24 | | |
| 5 | 18.00 | 17.52 | 17.04 | 16.56 | 16.08 | 15.60 | 15.12 | 14.64 | 14.16 | 13.68 | 13.20 | 12.72 | 12.24 | | |
| 6 | 22.25 | 21.77 | 21.29 | 20.81 | 20.33 | 19.85 | 19.37 | 18.89 | 18.41 | 17.93 | 17.45 | 16.97 | 16.49 | | |
| 7 | 26.75 | 26.27 | 25.79 | 25.31 | 24.83 | 24.35 | 23.87 | 23.39 | 22.91 | 22.43 | 21.95 | 21.47 | 20.99 | | |
| 8 | 31.50 | 31.02 | 30.54 | 30.06 | 29.58 | 29.10 | 28.62 | 28.14 | 27.66 | 27.18 | 26.70 | 26.22 | 25.74 | | |
| 9 | 36.50 | 36.02 | 35.54 | 35.06 | 34.58 | 34.10 | 33.62 | 33.14 | 32.66 | 32.18 | 31.70 | 31.22 | 30.74 | | |
| 10 | 41.75 | 41.27 | 40.79 | 40.31 | 39.83 | 39.35 | 38.87 | 38.39 | 37.91 | 37.43 | 36.95 | 36.47 | 35.99 | | |
| 11 | 47.25 | 46.77 | 46.29 | 45.81 | 45.33 | 44.85 | 44.37 | 43.89 | 43.41 | 42.93 | 42.45 | 41.97 | 41.49 | | |
| 12 | 53.00 | 52.52 | 52.04 | 51.56 | 51.08 | 50.60 | 50.12 | 49.64 | 49.16 | 48.68 | 48.20 | 47.72 | 47.24 | | |
| 13 | 59.00 | 58.52 | 58.04 | 57.56 | 57.08 | 56.60 | 56.12 | 55.64 | 55.16 | 54.68 | 54.20 | 53.72 | 53.24 | | |
| 14 | 65.25 | 64.77 | 64.29 | 63.81 | 63.33 | 62.85 | 62.37 | 61.89 | 61.41 | 60.93 | 60.45 | 59.97 | 59.49 | | |
| 15 | 71.75 | 71.27 | 70.79 | 70.31 | 69.83 | 69.35 | 68.87 | 68.39 | 67.91 | 67.43 | 66.95 | 66.47 | 65.99 | | |
| 16 | 78.50 | 78.02 | 77.54 | 77.06 | 76.58 | 76.10 | 75.62 | 75.14 | 74.66 | 74.18 | 73.70 | 73.22 | 72.74 | | |
| 17 | 85.50 | 85.02 | 84.54 | 84.06 | 83.58 | 83.10 | 82.62 | 82.14 | 81.66 | 81.18 | 80.70 | 80.22 | 79.74 | | |
| 18 | 92.75 | 92.27 | 91.79 | 91.31 | 90.83 | 90.35 | 89.87 | 89.39 | 88.91 | 88.43 | 87.95 | 87.47 | 86.99 | | |
| 19 | 100.25 | 99.77 | 99.29 | 98.81 | 98.33 | 97.85 | 97.37 | 96.89 | 96.41 | 95.93 | 95.45 | 94.97 | 94.49 | | |
| 20 | 108.00 | 107.52 | 107.04 | 106.56 | 106.08 | 105.60 | 105.12 | 104.64 | 104.16 | 103.68 | 103.20 | 102.72 | 102.24 | | |
| 21 | 116.00 | 115.52 | 115.04 | 114.56 | 114.08 | 113.60 | 113.12 | 112.64 | 112.16 | 111.68 | 111.20 | 110.72 | 110.24 | | |
| 22 | 124.25 | 123.77 | 123.29 | 122.81 | 122.33 | 121.85 | 121.37 | 120.89 | 120.41 | 119.93 | 119.45 | 118.97 | 118.49 | | |
| 23 | 132.75 | 132.27 | 131.79 | 131.31 | 130.83 | 130.35 | 129.87 | 129.39 | 128.91 | 128.43 | 127.95 | 127.47 | 126.99 | | |
| 24 | 141.50 | 141.02 | 140.54 | 140.06 | 139.58 | 139.10 | 138.62 | 138.14 | 137.66 | 137.18 | 136.70 | 136.22 | 135.74 | | |
| 25 | 150.50 | 150.02 | 149.54 | 149.06 | 148.58 | 148.10 | 147.62 | 147.14 | 146.66 | 146.18 | 145.70 | 145.22 | 144.74 | | |
| 26 | 160.00 | 159.52 | 159.04 | 158.56 | 158.08 | 157.60 | 157.12 | 156.64 | 156.16 | 155.68 | 155.20 | 154.72 | 154.24 | | |
| 27 | 170.00 | 169.52 | 169.04 | 168.56 | 168.08 | 167.60 | 167.12 | 166.64 | 166.16 | 165.68 | 165.20 | 164.72 | 164.24 | | |
| 28 | 180.25 | 179.77 | 179.29 | 178.81 | 178.33 | 177.85 | 177.37 | 176.89 | 176.41 | 175.93 | 175.45 | 174.97 | 174.49 | | |
| 29 | 190.75 | 190.27 | 189.79 | 189.31 | 188.83 | 188.35 | 187.87 | 187.39 | 186.91 | 186.43 | 185.95 | 185.47 | 184.99 | | |
| 30 | 201.50 | 201.02 | 200.54 | 200.06 | 199.58 | 199.10 | 198.62 | 198.14 | 197.66 | 197.18 | 196.70 | 196.22 | 195.74 | | |
| 31 | 212.50 | 212.02 | 211.54 | 211.06 | 210.58 | 210.10 | 209.62 | 209.14 | 208.66 | 208.18 | 207.70 | 207.22 | 206.74 | | |
| 32 | 223.75 | 223.27 | 222.79 | 222.31 | 221.83 | 221.35 | 220.87 | 220.39 | 219.91 | 219.43 | 218.95 | 218.47 | 217.99 | | |
| 33 | 235.25 | 234.77 | 234.29 | 233.81 | 233.33 | 232.85 | 232.37 | 231.89 | 231.41 | 230.93 | 230.45 | 229.97 | 229.49 | | |
| 34 | 247.00 | 246.52 | 246.04 | 245.56 | 245.08 | 244.60 | 244.12 | 243.64 | 243.16 | 242.68 | 242.20 | 241.72 | 241.24 | | |
| 35 | 259.00 | 258.52 | 258.04 | 257.56 | 257.08 | 256.60 | 256.12 | 255.64 | 255.16 | 254.68 | 254.20 | 253.72 | 253.24 | | |
| 36 | 271.25 | 270.77 | 270.29 | 269.81 | 269.33 | 268.85 | 268.37 | 267.89 | 267.41 | 266.93 | 266.45 | 265.97 | 265.49 | | |
| 37 | 283.75 | 283.27 | 282.79 | 282.31 | 281.83 | 281.35 | 280.87 | 280.39 | 279.91 | 279.43 | 278.95 | 278.47 | 277.99 | | |
| 38 | 296.50 | 296.02 | 295.54 | 295.06 | 294.58 | 294.10 | 293.62 | 293.14 | 292.66 | 292.18 | 291.70 | 291.22 | 290.74 | | |
| 39 | 309.50 | 309.02 | 308.54 | 308.06 | 307.58 | 307.10 | 306.62 | 306.14 | 305.66 | 305.18 | 304.70 | 304.22 | 303.74 | | |
| 40 | 322.75 | 322.27 | 321.79 | 321.31 | 320.83 | 320.35 | 319.87 | 319.39 | 318.91 | 318.43 | 317.95 | 317.47 | 316.99 | | |
| 41 | 336.25 | 335.77 | 335.29 | 334.81 | 334.33 | 333.85 | 333.37 | 332.89 | 332.41 | 331.93 | 331.45 | 330.97 | 330.49 | | |
| 42 | 350.00 | 349.52 | 349.04 | 348.56 | 348.08 | 347.60 | 347.12 | 346.64 | 346.16 | 345.68 | 345.20 | 344.72 | 344.24 | | |
| 43 | 364.00 | 363.52 | 363.04 | 362.56 | 362.08 | 361.60 | 361.12 | 360.64 | 360.16 | 359.68 | 359.20 | 358.72 | 358.24 | | |
| 44 | 378.25 | 377.77 | 377.29 | 376.81 | 376.33 | 375.85 | 375.37 | 374.89 | 374.41 | 373.93 | 373.45 | 372.97 | 372.49 | | |
| 45 | 392.75 | 392.27 | 391.79 | 391.31 | 390.83 | 390.35 | 389.87 | 389.39 | 388.91 | 388.43 | 387.95 | 387.47 | 386.99 | | |
| 46 | 407.50 | 407.02 | 406.54 | 406.06 | 405.58 | 405.10 | 404.62 | 404.14 | 403.66 | 403.18 | 402.70 | 402.22 | 401.74 | | |
| 47 | 422.50 | 422.02 | 421.54 | 421.06 | 420.58 | 420.10 | 419.62 | 419.14 | 418.66 | 418.18 | 417.70 | 417.22 | 416.74 | | |
| 48 | 437.75 | 437.27 | 436.79 | 436.31 | 435.83 | 435.35 | 434.87 | 434.39 | 433.91 | 433.43 | 432.95 | 432.47 | 431.99 | | |
| 49 | 453.25 | 452.77 | 452.29 | 451.81 | 451.33 | 450.85 | 450.37 | 449.89 | 449.41 | 448.93 | 448.45 | 447.97 | 447.49 | | |
| 50 | 469.00 | 468.52 | 468.04 | 467.56 | 467.08 | 466.60 | 466.12 | 465.64 | 465.16 | 464.68 | 464.20 | 463.72 | 463.24 | | |
| 51 | 485.00 | 484.52 | 484.04 | 483.56 | 483.08 | 482.60 | 482.12 | 481.64 | 481.16 | 480.68 | 480.20 | 479.72 | 479.24 | | |
| 52 | 501.25 | 500.77 | 500.29 | 499.81 | 499.33 | 498.85 | 498.37 | 497.89 | 497.41 | 496.93 | 496.45 | 495.97 | 495.49 | | |
| 53 | 517.75 | 517.27 | 516.79 | 516.31 | 515.83 | 515.35 | 514.87 | 514.39 | 513.91 | 513.43 | 512.95 | 512.47 | 511.99 | | |
| 54 | 534.50 | 534.02 | 533.54 | 533.06 | 532.58 | 532.10 | 531.62 | 531.14 | 530.66 | 530.18 | 529.70 | 529.22 | 528.74 | | |
| 55 | 551.50 | 551.02 | 550.54 | 550.06 | 549.58 | 549.10 | 548.62 | 548.14 | 547.66 | 547.18 | 546.70 | 546.22 | 545.74 | | |
| 56 | 568.75 | 568.27 | 567.79 | 567.31 | 566.83 | 566.35 | 565.87 | 565.39 | 564.91 | 564.43 | 563.95 | 563.47 | 562.99 | | |
| 57 | 586.25 | 585.77 | 585.29 | 584.81 | 584.33 | 583.85 | 583.37 | 582.89 | 582.41 | 581.93 | 581.45 | 580.97 | 580.49 | | |
| 58 | 604.00 | 603.52 | 603.04 | 602.56 | 602.08 | 601.60 | 601.12 | 600.64 | 600.16 | 599.68 | 599.20 | 598.72 | 598.24 | | |
| 59 | 622.00 | 621.52 | 621.04 | 620.56 | 620.08 | 619.60 | 619.12 | 618.64 | 618.16 | 617.68 | 617.20 | 616.72 | 616.24 | | |
| 60 | 640.25 | 639.77 | 639.29 | 638.81 | 638.33 | 637.85 | 637.37 | 636.89 | 636.41 | 635.93 | 635.45 | 634.97 | 634.49 | | |
| 61 | 658.75 | 658.27 | 657.79 | 657.31 | 656.83 | 656.35 | 655.87 | 655.39 | 654.91 | 654.43 | 653.95 | 653.47 | 652.99 | | |
| 62 | 677.50 | 677.02 | 676.54 | 676.06 | 675.58 | 675.10 | 674.62 | 674.14 | 673.66 | 673.18 | 672.70 | 672.22 | 671.74 | | |
| 63 | 696.50 | 696.02 | 695.54 | 695.06 | 694.58 | 694.10 | 693.62 | 693.14 | 692.66 | 692.18 | 691.70 | 691.22 | 690.74 | | |
| 64 | 715.75 | 715.27 | 714.79 | 714.31 | 713.83 | 713.35 | 712.87 | 712.39 | 711.91 | 711.43 | 710.95 | 710.47 | 709.99 | | |
| 65 | 735.25 | 734.77 | 734.29 | 733.81 | 733.33 | 732.85 | 732.37 | 731.89 | 731.41 | 730.93 | 730.45 | 729.97 | 729.49 | | |
| 66 | 755.00 | 754.52 | 754.04 | 753.56 | 753.08 | 752.60 | 752.12 | 751.64 | 751.16 | 750.68 | 750.20 | 749.72 | 749.24 | | |
| 67 | 775.00 | 774.52 | 774.04 | 773.56 | 773.08 | 772.60 | 772.12 | 771.64 | 771.16 | 770.68 | 770.20 | 769.72 | 769.24 | | |
| 68 | 795.25 | 794.77 | 794.29 | 793.81 | 793.33 | 792.85 | 792.37 | 791.89 | 791.41 | 790.93 | | | | | |

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TABLE 8.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| RUNWAY | MSC PEAK WINDS MONTH OF AUG. | | | | | CROSSWINDS | | | | | TOTAL NUMBER OPS. |
|--------|------------------------------|--------|----------|----------|----------|------------|----------------|--|--|--|-------------------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | ZERO CROSSWIND | | | | |
| 0-02 | 73.12 | 10.81 | .74 | .03 | .11 | .00 | 15.11 | | | | 1674 |
| 03-06 | 72.52 | 8.54 | .87 | .18 | .00 | .07 | 18.34 | | | | 1674 |
| 06-09 | 69.18 | 15.25 | 1.67 | .24 | .00 | .00 | 13.57 | | | | 1674 |
| 09-11 | 49.04 | 44.21 | 3.84 | .24 | .00 | .00 | 3.59 | | | | 1674 |
| 12-14 | 21.51 | 70.40 | 5.44 | .60 | .18 | .06 | 1.73 | | | | 1674 |
| 15-17 | 26.46 | 63.02 | 6.81 | 1.02 | .24 | .30 | 2.15 | | | | 1674 |
| 17-20 | 65.29 | 21.74 | 1.61 | .43 | .06 | .07 | 4.78 | | | | 1674 |
| 21-23 | 72.40 | 14.28 | 1.07 | .67 | .00 | .06 | 11.65 | | | | 1674 |
| 20-27 | 56.07 | 31.60 | 2.70 | .42 | .08 | .05 | 8.87 | | | | 13392 |

TABLE 8.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| HR. | RUNWAY 15 TAILWIND | | | | | RUNWAY 33 TAILWIND | | | | | TOTAL NUMBER OPS. |
|-------|--------------------|--------|----------|----------|----------|--------------------|--------|--------|----------|-------------|-------------------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | 1 TO 4 | 5 TO 9 | 10 ABOVE | PERCENTAGES | |
| 0-02 | 1.61 | .24 | .00 | .00 | .00 | .00 | 46.06 | 17.43 | 7.29 | 7.29 | |
| 03-05 | 3.17 | .18 | .00 | .00 | .00 | .00 | 52.03 | 31.82 | 5.38 | 5.38 | |
| 06-08 | 3.52 | .30 | .00 | .00 | .00 | .00 | 37.34 | 40.50 | 13.32 | 13.32 | |
| 09-11 | .90 | .04 | .18 | .04 | .00 | .00 | 4.82 | 49.10 | 43.25 | 43.25 | |
| 12-14 | .12 | .72 | .12 | .12 | .00 | .00 | .90 | 25.93 | 71.21 | 71.21 | |
| 15-17 | .24 | .24 | .36 | .36 | .00 | .00 | 4.30 | 28.49 | 65.05 | 65.05 | |
| 18-20 | .72 | .42 | .18 | .18 | .00 | .00 | 21.83 | 52.09 | 24.07 | 24.07 | |
| 21-23 | 1.43 | .48 | .00 | .00 | .00 | .00 | 38.35 | 42.65 | 12.25 | 12.25 | |
| 20-27 | 1.46 | .45 | .10 | .10 | .00 | .00 | 25.55 | 38.70 | 30.23 | 30.23 | |

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TABLE 9.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF AUG. | | NUMBER OPS. | | SUMMARY 33 | | CROSSING LIMITS | | PERCENTAGES | | 25- UP | | ZERO CROSS | | TOTAL | | | | | | | | |
|-------------------------|--------|-------------------------|--------|---------------|----------|-------------|----------|------------|------------|-----------------|--------|-------------|----------|----------|--------|------------|--------|--------|----------|----------|----------|--------|------------|-------|-------|-------|
| MCUR 3 | MCUR 5 | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | | |
| 2.59 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.87 | .18 | 91.27 | 2.22 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 8.78 | 52.33 | |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | 77.78 | 1.08 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.05 | 31.90 | |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | 4.91 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | 6.63 | |
| 2.59 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.05 | .18 | 69.18 | 9.32 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 12.01 | 90.86 | |
| MSC PEAK WINDS | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF AUG. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NUMBER OPS. 558 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MCUR 3 | MCUR 5 | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | | |
| 3.23 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.58 | .18 | 91.59 | 2.15 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 6.27 | 50.00 | |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | 74.99 | 1.61 | .58 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.51 | 33.15 | |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | 4.30 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 9.66 | |
| 3.23 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.76 | .18 | 70.25 | 8.06 | .72 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 8.78 | 87.81 | |
| MSC PEAK WINDS | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF AUG. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NUMBER OPS. 558 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MCUR 3 | MCUR 5 | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | | |
| 2.59 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.05 | .18 | 88.27 | 1.61 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 7.89 | 53.76 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | 75.27 | .90 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.69 | 29.23 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 4.66 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 9.88 | |
| 2.59 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.23 | .18 | 69.52 | 7.17 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 10.57 | 87.81 |

TABLE 4.3. (Continued)

| MSC YEAR WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF AUG. | | NUMBER OPS. | | 550 | | |
|--|------|-------------------------|-----|---------------|-----|-------------|-------|---------|------|-----|
| M-UP 6 | | M-UP 7 | | M-UP 8 | | M-UP 9 | | M-UP 10 | | |
| <p>MSC YEAR WINDS TAILWINDS VS CROSSWINDS MONTH OF AUG. NUMBER OPS. 550</p> | | | | | | | | | | |
| <p>M-UP 6 M-UP 7 M-UP 8 M-UP 9 M-UP 10</p> | | | | | | | | | | |
| <p>TAILWIND LIMITS 1 TO 5 TO 9 15 TO 19 20 TO 24 25- UP ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS</p> | | | | | | | | | | |
| <p>BUNNY 11 BUNNY 12 BUNNY 13</p> | | | | | | | | | | |
| <p>TAILWIND LIMITS 1 TO 5 TO 9 15 TO 19 20 TO 24 25- UP ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS</p> | | | | | | | | | | |
| <p>PERCENTAGES PERCENTAGES PERCENTAGES</p> | | | | | | | | | | |
| 1 TO 9 | 2.33 | .18 | .00 | .00 | .18 | 2.69 | 45.77 | .90 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .38 | 23.37 | .90 | .36 | .00 |
| 15-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 5.02 | .72 | .36 |
| TOTAL | 2.33 | .18 | .00 | .00 | .18 | 3.05 | 69.00 | 6.81 | 1.08 | .36 |
| <p>MSC YEAR WINDS TAILWINDS VS CROSSWINDS MONTH OF AUG. NUMBER OPS. 550</p> | | | | | | | | | | |
| <p>M-UP 6 M-UP 7 M-UP 8 M-UP 9 M-UP 10</p> | | | | | | | | | | |
| <p>TAILWIND LIMITS 1 TO 5 TO 9 15 TO 19 20 TO 24 25- UP ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS</p> | | | | | | | | | | |
| <p>BUNNY 11 BUNNY 12 BUNNY 13</p> | | | | | | | | | | |
| <p>TAILWIND LIMITS 1 TO 5 TO 9 15 TO 19 20 TO 24 25- UP ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS</p> | | | | | | | | | | |
| <p>PERCENTAGES PERCENTAGES PERCENTAGES</p> | | | | | | | | | | |
| 1 TO 9 | 0.12 | .72 | .00 | .00 | .00 | 0.04 | 29.57 | 1.25 | .18 | .18 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .14 | 36.92 | .90 | .72 | .00 |
| 15-UP | .00 | .00 | .00 | .00 | .00 | .00 | .54 | 9.14 | 1.25 | .00 |
| TOTAL | 0.12 | .72 | .00 | .00 | .00 | 0.18 | 67.03 | 11.29 | 2.15 | .18 |
| <p>MSC YEAR WINDS TAILWINDS VS CROSSWINDS MONTH OF AUG. NUMBER OPS. 550</p> | | | | | | | | | | |
| <p>M-UP 6 M-UP 7 M-UP 8 M-UP 9 M-UP 10</p> | | | | | | | | | | |
| <p>TAILWIND LIMITS 1 TO 5 TO 9 15 TO 19 20 TO 24 25- UP ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS</p> | | | | | | | | | | |
| <p>BUNNY 11 BUNNY 12 BUNNY 13</p> | | | | | | | | | | |
| <p>TAILWIND LIMITS 1 TO 5 TO 9 15 TO 19 20 TO 24 25- UP ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS ZERO CROSS</p> | | | | | | | | | | |
| <p>PERCENTAGES PERCENTAGES PERCENTAGES</p> | | | | | | | | | | |
| 1 TO 9 | 1.25 | 1.75 | .00 | .00 | .00 | 3.05 | 14.24 | 3.23 | .00 | .18 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .36 | 47.44 | 1.74 | .72 | .00 |
| 15-UP | .00 | .00 | .00 | .00 | .00 | .00 | 1.97 | 19.71 | .54 | .00 |
| TOTAL | 1.25 | 1.75 | .00 | .00 | .00 | 3.41 | 63.65 | 5.47 | 1.25 | .18 |

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TABLE 5.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF AUG. | | NUMBER OPS. | | 579 | | BUNWAY 11 | | 579 | | BUNWAY 15 | | 579 | | BUNWAY 33 | | 579 | | TOTAL | | | | | |
|-------------------------|--------|-------------------------|----------|---------------|----------|-------------|------------|-------|-------------|-----------|--------|----------|----------|-----------|--------|------------|-------|-------------|--------|--------|----------|----------|----------|--------|------------|-------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | PERCENTAGES | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | |
| .72 | .72 | .72 | .72 | .72 | .72 | .72 | .00 | 1.83 | .00 | 5.39 | 2.69 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 9.24 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .72 | .00 | 47.67 | 1.79 | 2.15 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 56.88 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .76 | .00 | 2.15 | 29.75 | 1.05 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 33.51 |
| .72 | 1.25 | .36 | .19 | .00 | .00 | .00 | .00 | 2.51 | .00 | 45.27 | 30.23 | 3.01 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 96.24 |
| MSC PEAK WINDS | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF AUG. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NUMBER OPS. 579 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BUNWAY 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 579 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BUNWAY 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 579 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BUNWAY 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 579 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | |

TABLE 8.3. (Continued)

PER YEAR GROSS YIELDERS VS CROSSLINGS
MAY 15 1952-53 500

| YIELDING LIMITS | SUMMER 15 | | | | SUMMER 15 | | | | TOTAL |
|-----------------|-----------|-----|-----|-----|-----------|-----|-----|-----|-------|
| | 1 1/2 | 2 | 3 | 4 | 1 1/2 | 2 | 3 | 4 | |
| TOTAL | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1 1/2 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 2 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 3 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 4 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| TOTAL | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

PER YEAR GROSS YIELDERS VS CROSSLINGS
MAY 16 1952-53 510

| YIELDING LIMITS | SUMMER 16 | | | | SUMMER 16 | | | | TOTAL |
|-----------------|-----------|-----|-----|-----|-----------|-----|-----|-----|-------|
| | 1 1/2 | 2 | 3 | 4 | 1 1/2 | 2 | 3 | 4 | |
| TOTAL | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1 1/2 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 2 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 3 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 4 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| TOTAL | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

PER YEAR GROSS YIELDERS VS CROSSLINGS
MAY 17 1952-53 520

| YIELDING LIMITS | SUMMER 17 | | | | SUMMER 17 | | | | TOTAL |
|-----------------|-----------|-----|-----|-----|-----------|-----|-----|-----|-------|
| | 1 1/2 | 2 | 3 | 4 | 1 1/2 | 2 | 3 | 4 | |
| TOTAL | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1 1/2 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 2 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 3 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 4 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| TOTAL | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

TABLE 8.3. (Continued)

| MSC PEAK WINDS | | | | | | | | | | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|-------|-------|------|-----|-----|-----|-----|-----|-----|-----|-----|
| MONTH OF AUG. | | | | | | | | | | | MONTH OF AUG. | | | | | | | | | | | |
| WIND 18 | | | | | | | | | | | WIND 19 | | | | | | | | | | | |
| NUMBER OBS. 550 | | | | | | | | | | | NUMBER OBS. 550 | | | | | | | | | | | |
| SUNDAY 15 | | | | | | | | | | | SUNDAY 15 | | | | | | | | | | | |
| CROSSWIND LIMITS % | | | | | | | | | | | CROSSWIND LIMITS % | | | | | | | | | | | |
| 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | PERCENTAGES | | | | | | | | | | | |
| TAILWIND LIMITS % | | | | | | | | | | | TAILWIND LIMITS % | | | | | | | | | | | |
| 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | PERCENTAGES | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | TOTAL | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | ZERO CROSS | | | | | | | | | | | |
| UP | | | | | | | | | | | UP | | | | | | | | | | | |
| DOWN | | | | | | | | | | | DOWN | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | TOTAL | | | | | | | | | | | |
| .35 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .54 | .72 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | |
| .00 | .16 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | |
| .00 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .36 | .72 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | |
| .35 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.08 | 50.00 | 43.00 | 1.61 | .72 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| | | | | | | | | | | | | | | | | | | | | | | |
| SUNDAY 15 | | | | | | | | | | | SUNDAY 15 | | | | | | | | | | | |
| CROSSWIND LIMITS % | | | | | | | | | | | CROSSWIND LIMITS % | | | | | | | | | | | |
| 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | PERCENTAGES | | | | | | | | | | | |
| TAILWIND LIMITS % | | | | | | | | | | | TAILWIND LIMITS % | | | | | | | | | | | |
| 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | PERCENTAGES | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | TOTAL | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | ZERO CROSS | | | | | | | | | | | |
| UP | | | | | | | | | | | UP | | | | | | | | | | | |
| DOWN | | | | | | | | | | | DOWN | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | TOTAL | | | | | | | | | | | |
| .54 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .72 | 19.18 | .72 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .54 | 49.72 | 4.30 | .54 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .72 | 17.56 | .54 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .54 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.25 | 69.10 | 22.58 | 1.25 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| | | | | | | | | | | | | | | | | | | | | | | |
| SUNDAY 15 | | | | | | | | | | | SUNDAY 15 | | | | | | | | | | | |
| CROSSWIND LIMITS % | | | | | | | | | | | CROSSWIND LIMITS % | | | | | | | | | | | |
| 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | PERCENTAGES | | | | | | | | | | | |
| TAILWIND LIMITS % | | | | | | | | | | | TAILWIND LIMITS % | | | | | | | | | | | |
| 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | 1 TO 4 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | PERCENTAGES | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | TOTAL | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | ZERO CROSS | | | | | | | | | | | |
| UP | | | | | | | | | | | UP | | | | | | | | | | | |
| DOWN | | | | | | | | | | | DOWN | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | TOTAL | | | | | | | | | | | |
| .54 | .16 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .90 | 29.93 | .54 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .54 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .54 | 44.62 | 2.33 | .54 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 | .72 | 13.08 | .72 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .54 | .16 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.61 | 75.27 | 15.95 | 1.25 | .36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

TABLE 4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| MRS | MNC PEAK WINDS | | | | MNC PEAK WINDS | | | | MNC PEAK WINDS | | | | |
|-------|--|----------------------|----------------------|----------------------|--|----------------------|----------------------|----------------------|--|----------------------|----------------------|----------------------|----------------------|
| | MONTH OF AUG. | | | | MONTH OF AUG. | | | | MONTH OF AUG. | | | | |
| | 000 RUNWAY 15 | 000 RUNWAY 33 | 000 RUNWAY 33 | 000 RUNWAY 33 | 000 RUNWAY 15 | 000 RUNWAY 15 | 000 RUNWAY 15 | 000 RUNWAY 15 | 000 RUNWAY 15 | 000 RUNWAY 33 | 000 RUNWAY 33 | 000 RUNWAY 33 | 000 RUNWAY 33 |
| | GIVEN A HEADWIND TAILWIND REVERSALS | | | | GIVEN A HEADWIND TAILWIND REVERSALS | | | | GIVEN A HEADWIND TAILWIND REVERSALS | | | | |
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| | TOTAL | HEAD-TO-TAIL | TAIL-TO-HEAD | TO HEAD | TOTAL | HEAD-TO-TAIL | TAIL-TO-HEAD | TO HEAD | TOTAL | HEAD-TO-TAIL | TAIL-TO-HEAD | TO HEAD | TOTAL |
| 00-02 | 3.47 | 2.09 | 1.38 | 2.13 | 74.19 | 0.14 | 3.47 | 4.67 | 47.93 | 5.03 | | | |
| 03-04 | 3.95 | 1.97 | 1.97 | 2.04 | 58.93 | 0.87 | 4.67 | 5.21 | 41.71 | 5.86 | | | |
| 05-06 | 5.45 | 2.67 | 2.61 | 2.74 | 73.44 | 4.16 | 5.75 | 3.41 | 64.86 | 3.74 | | | |
| 08-11 | 2.75 | 1.14 | 1.62 | 1.16 | 84.38 | 3.05 | 1.80 | 1.26 | 55.56 | 1.30 | | | |
| 17-14 | 1.08 | .54 | .54 | .54 | 56.25 | 1.20 | .60 | .60 | 30.30 | .61 | | | |
| 15-17 | 1.68 | .84 | .84 | .85 | 92.35 | 1.97 | .96 | 1.02 | 44.44 | 1.04 | | | |
| 17-20 | 1.68 | .96 | .72 | .97 | 54.55 | 3.23 | 1.08 | 2.15 | 38.30 | 2.22 | | | |
| 21-23 | 2.09 | .90 | 1.20 | .92 | 62.50 | 7.54 | 3.77 | 3.77 | 55.75 | 4.04 | | | |
| 00-27 | 2.77 | 1.38 | 1.38 | 1.41 | 68.52 | 5.52 | 2.76 | 2.76 | 49.93 | 2.92 | | | |

8.4A

8.4B

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TABLE 9.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| HOUR | MSC PEAK WINDS MONTH OF SEPT. | | | | | TOTAL NUMBER OBS. | | |
|-------|-------------------------------|--------|----------|----------|----------|-------------------|----------|-------|
| | CROSSWIND | | | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | 25 ABOVE | |
| 10-02 | 62.22 | 25.73 | 3.27 | .94 | .06 | .23 | 7.54 | 1710 |
| 11-05 | 64.33 | 22.63 | 2.69 | 1.05 | .06 | .12 | 9.12 | 1710 |
| 12-08 | 59.42 | 26.48 | 2.33 | .99 | .12 | .00 | 7.66 | 1710 |
| 13-11 | 37.84 | 53.92 | 5.56 | 1.52 | .18 | .06 | .94 | 1710 |
| 14-14 | 19.65 | 70.56 | 7.13 | 1.81 | .53 | .23 | .58 | 1710 |
| 15-17 | 26.26 | 64.64 | 6.20 | 1.75 | .41 | .23 | .47 | 1710 |
| 16-20 | 55.09 | 35.56 | 5.56 | 1.05 | .18 | .35 | 2.22 | 1710 |
| 17-23 | 59.30 | 32.24 | 3.92 | .82 | .18 | .29 | 4.21 | 1710 |
| 18-27 | 47.89 | 41.67 | 4.71 | 1.24 | .21 | .19 | 4.09 | 13687 |

TABLE 9.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| HRS | MSC PEAK WINDS MONTH OF SEPT. | | | | | TOTAL NUMBER OBS. | | | |
|-------|-------------------------------|--------|----------|--------|--------|-------------------|----------|-------|-------|
| | TAILWIND | | | | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 ABOVE | 1 TO 4 | 5 TO 9 | | 10 ABOVE | | |
| 10-02 | 2.34 | .64 | .12 | 27.78 | 40.23 | 25.50 | 35.85 | 34.97 | 21.35 |
| 11-05 | 2.57 | .56 | .00 | 29.47 | 35.96 | 26.08 | 29.47 | 35.96 | 26.08 |
| 12-08 | 3.86 | .98 | .12 | 4.27 | 39.54 | 54.33 | 4.27 | 39.54 | 54.33 |
| 13-11 | .76 | 1.40 | .47 | 1.75 | 21.93 | 73.92 | 1.75 | 21.93 | 73.92 |
| 14-14 | .76 | .76 | 1.17 | 2.41 | 27.43 | 68.19 | 2.41 | 27.43 | 68.19 |
| 15-17 | .00 | .47 | 1.11 | 14.04 | 45.96 | 36.32 | 14.04 | 45.96 | 36.32 |
| 16-20 | .94 | 1.17 | .99 | 23.22 | 40.58 | 31.58 | 23.22 | 40.58 | 31.58 |
| 17-23 | 1.27 | 1.05 | .63 | 17.40 | 35.70 | 42.16 | 17.40 | 35.70 | 42.16 |
| 18-27 | 1.54 | .87 | .56 | 17.40 | 35.70 | 42.16 | 17.40 | 35.70 | 42.16 |

TABLE 9.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| MSC PEAK WINDS | | | | | | | | | | | |
|--|------|-------------|-----|-------------|-----|-------------|-------|-------------|------|-------------|-----|
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
| MONTH OF SEPT. | | | | | | | | | | | |
| HOUR C | | NUMBER OBS. | | 570 | | 570 | | 570 | | 570 | |
| TAILWIND LIMITS | | ZERO CROSS | | 25-UP | | 25-UP | | 25-UP | | ZERO CROSS | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | | 21 TO 24 | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | | 21 TO 24 | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1.25 | .86 | .00 | .00 | .00 | .00 | 1.93 | 20.70 | .88 | .18 | .00 | .00 |
| .00 | .35 | .00 | .00 | .00 | .00 | .53 | 19.30 | 1.58 | .93 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .18 | 1.23 | 23.32 | 2.46 | .70 | .18 |
| 1.25 | 1.05 | .35 | .00 | .18 | .00 | 2.63 | 61.23 | 25.79 | 3.15 | .70 | .18 |
| SUNWAY 15 | | | | | | | | | | | |
| CROSSWIND LIMITS | | | | | | | | | | | |
| 1 TO 4 5 TO 8 9 TO 12 13 TO 16 17 TO 20 21 TO 24 | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | |
| 25-UP | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | |
| MSC PEAK WINDS | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
| MONTH OF SEPT. | | | | | | | | | | | |
| HOUR 1 | | NUMBER OBS. | | 570 | | 570 | | 570 | | 570 | |
| TAILWIND LIMITS | | ZERO CROSS | | 25-UP | | 25-UP | | 25-UP | | ZERO CROSS | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | | 21 TO 24 | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | | 21 TO 24 | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1.25 | .86 | .00 | .00 | .00 | .00 | 1.93 | 22.81 | 1.58 | .00 | .00 | .18 |
| .00 | .77 | .00 | .00 | .00 | .00 | .88 | 16.49 | 1.40 | .35 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .18 | .70 | 20.70 | 2.63 | 1.05 | .00 |
| 1.25 | 1.68 | .18 | .18 | .00 | .00 | 2.98 | 60.00 | 23.68 | 2.98 | 1.05 | .00 |
| SUNWAY 33 | | | | | | | | | | | |
| CROSSWIND LIMITS | | | | | | | | | | | |
| 1 TO 4 5 TO 8 9 TO 12 13 TO 16 17 TO 20 21 TO 24 | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | |
| 25-UP | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | |
| MSC PEAK WINDS | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
| MONTH OF SEPT. | | | | | | | | | | | |
| HOUR 2 | | NUMBER OBS. | | 570 | | 570 | | 570 | | 570 | |
| TAILWIND LIMITS | | ZERO CROSS | | 25-UP | | 25-UP | | 25-UP | | ZERO CROSS | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | | 21 TO 24 | |
| 1 TO 4 | | 5 TO 8 | | 9 TO 12 | | 13 TO 16 | | 17 TO 20 | | 21 TO 24 | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 2.11 | 1.05 | .00 | .00 | .00 | .00 | 3.16 | 28.78 | 2.11 | .35 | .00 | .00 |
| .00 | .35 | .00 | .00 | .00 | .00 | .53 | 35.66 | 2.28 | .00 | .18 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .57 | 19.30 | 2.63 | .70 | .00 |
| 2.11 | 1.40 | .18 | .00 | .00 | .00 | 3.68 | 61.23 | 23.68 | 2.98 | .68 | .18 |

TABLE 9.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF SEPT. | | NUMBER OBS. 570 | | RUNWAY 33 | | CROSSWIND LIMITS *** | | PERCENTAGES | | ZERO CROSS | | TOTAL | |
|-------------------------|--------|-------------------------|--------|----------------|--------|-----------------|--------|-----------|--------|----------------------|--------|-------------|--------|------------|--------|--------|-------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | TOTAL |
| 1 TO 4 | .35 | 1.23 | .00 | .00 | 1.58 | 25.95 | 2.11 | .53 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 31.93 |
| 5 TO 9 | .00 | .53 | .00 | .00 | .70 | 35.61 | 1.93 | .09 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 38.82 |
| 10-18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 22.98 |
| TOTAL | .35 | 1.75 | .00 | .00 | 2.28 | 61.75 | 27.98 | 3.33 | 1.05 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 93.33 |
| KCC PEAK WINDS | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | |
| MONTH OF SEPT. | | | | | | | | | | | | | | | | | |
| NUMBER OBS. 570 | | | | | | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | | | | | | |
| CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | | | | | |
| 1 TO 4 | 2.46 | .35 | .00 | .00 | 2.81 | 31.58 | 1.93 | .35 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 37.89 |
| 5 TO 9 | .00 | .35 | .00 | .00 | .53 | 31.93 | 1.23 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 33.86 |
| 10-18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 21.05 |
| TOTAL | 2.46 | .70 | .00 | .00 | 3.33 | 64.21 | 21.40 | 1.23 | 1.23 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 92.81 |
| MSC PEAK WINDS | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | |
| MONTH OF SEPT. | | | | | | | | | | | | | | | | | |
| NUMBER OBS. 570 | | | | | | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | | | | | | |
| CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | | | | | |
| 1 TO 4 | 2.58 | .35 | .00 | .00 | 3.33 | 31.05 | 2.28 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 37.72 |
| 5 TO 9 | .00 | .53 | .00 | .00 | .53 | 30.00 | 1.93 | .35 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 32.63 |
| 10-18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 20.00 |
| TOTAL | 2.58 | .88 | .00 | .00 | 3.86 | 61.22 | 20.18 | 3.16 | .88 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 90.35 |

TABLE 9.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF SEPT. | | NUMBER OBS. | | 570 | |
|-----------------|------|-------------------------|------|-----------------|------|-----------------|------|-----------------|------|
| HOUR 6 | | HOUR 7 | | HOUR 8 | | HOUR 9 | | HOUR 10 | |
| SUNDAY 11 | | SUNDAY 12 | | SUNDAY 13 | | SUNDAY 14 | | SUNDAY 15 | |
| TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | | TAILWIND LIMITS | |
| 1 TO 4 | | 1 TO 4 | | 1 TO 4 | | 1 TO 4 | | 1 TO 4 | |
| 5 TO 9 | | 5 TO 9 | | 5 TO 9 | | 5 TO 9 | | 5 TO 9 | |
| 10 TO 14 | | 10 TO 14 | | 10 TO 14 | | 10 TO 14 | | 10 TO 14 | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | TOTAL | |
| 1 TO 4 | 0.74 | 0.74 | 0.74 | 0.74 | 0.74 | 0.74 | 0.74 | 0.74 | 0.74 |
| 5 TO 9 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| 10 TO 14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| TOTAL | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 |
| 1 TO 4 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 |
| 5 TO 9 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| 10 TO 14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| TOTAL | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 |
| 1 TO 4 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 |
| 5 TO 9 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| 10 TO 14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| TOTAL | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 |
| 1 TO 4 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 |
| 5 TO 9 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| 10 TO 14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| TOTAL | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 |
| 1 TO 4 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 |
| 5 TO 9 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| 10 TO 14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| TOTAL | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 |

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TABLE 9.3. (Continued)

| ASC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF SEPT. | | NUMBER OBS. | | 570 | |
|--|-----|--|-----|--|-------|-------------|------|------|-----|
| | | SUNDAY 11 | | SUNDAY 12 | | | | | |
| TAILWIND LIMITS | | CROSSING LIMITS | | CROSSING LIMITS | | | | | |
| 1 TO 5 TO 9 10 TO 15 TO 19 20 TO 24 25- UP | | 1 TO 5 TO 9 10 TO 15 TO 19 20 TO 24 25- UP | | 1 TO 5 TO 9 10 TO 15 TO 19 20 TO 24 25- UP | | | | | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | | | | |
| 1 TO 5 | .23 | 1.23 | .00 | 1.75 | 1.51 | 1.92 | .70 | .00 | .18 |
| 5 TO 9 | .00 | .00 | .00 | 1.75 | 4.27 | 7.98 | .79 | .00 | .00 |
| 9 TO 15 | .00 | .00 | .00 | .70 | .70 | 19.47 | 2.11 | 1.05 | .00 |
| TOTAL | .23 | 1.23 | .00 | 4.21 | 65.44 | 44.39 | 3.51 | 1.05 | .18 |
| ASC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF SEPT. | | | | | |
| | | SUNDAY 11 | | SUNDAY 12 | | | | | |
| TAILWIND LIMITS | | CROSSING LIMITS | | CROSSING LIMITS | | | | | |
| 1 TO 5 TO 9 10 TO 15 TO 19 20 TO 24 25- UP | | 1 TO 5 TO 9 10 TO 15 TO 19 20 TO 24 25- UP | | 1 TO 5 TO 9 10 TO 15 TO 19 20 TO 24 25- UP | | | | | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | | | | |
| 1 TO 5 | .00 | .18 | .00 | .18 | 1.97 | 2.13 | .70 | .00 | .18 |
| 5 TO 9 | .00 | .00 | .00 | 1.75 | 14.10 | 7.44 | 1.05 | .18 | .00 |
| 9 TO 15 | .00 | .00 | .00 | .18 | 1.54 | 48.42 | 3.16 | .70 | .00 |
| TOTAL | .00 | .18 | .00 | 2.11 | 17.00 | 52.96 | 4.91 | .00 | .18 |
| ASC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF SEPT. | | | | | |
| | | SUNDAY 11 | | SUNDAY 12 | | | | | |
| TAILWIND LIMITS | | CROSSING LIMITS | | CROSSING LIMITS | | | | | |
| 1 TO 5 TO 9 10 TO 15 TO 19 20 TO 24 25- UP | | 1 TO 5 TO 9 10 TO 15 TO 19 20 TO 24 25- UP | | 1 TO 5 TO 9 10 TO 15 TO 19 20 TO 24 25- UP | | | | | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | | | | |
| 1 TO 5 | .00 | .18 | .00 | .18 | .53 | .57 | .35 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .72 | 26.77 | 1.75 | .35 | .00 | .00 |
| 9 TO 15 | .00 | .00 | .00 | .18 | .35 | 58.95 | 5.09 | .70 | .18 |
| TOTAL | .00 | .18 | .00 | 1.00 | 29.65 | 61.27 | 5.79 | 1.05 | .18 |

TABLE 9.3. (Continued)

RSC PEAK WINDS MONTH OF SEPT.

MON 12 NUMBER OBS. 570

| TAILWIND LIMITS | BUNWAY 12 | | | | BUNWAY 13 | | | | ZERO CROSS | TOTAL |
|-----------------|-----------|--------|----------|----------|-----------|--------|----------|----------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-14 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

RSC PEAK WINDS MONTH OF SEPT.

MON 13 NUMBER OBS. 570

| TAILWIND LIMITS | BUNWAY 13 | | | | BUNWAY 14 | | | | ZERO CROSS | TOTAL |
|-----------------|-----------|--------|----------|----------|-----------|--------|----------|----------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-14 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

RSC PEAK WINDS MONTH OF SEPT.

MON 14 NUMBER OBS. 570

| TAILWIND LIMITS | BUNWAY 14 | | | | BUNWAY 15 | | | | ZERO CROSS | TOTAL |
|-----------------|-----------|--------|----------|----------|-----------|--------|----------|----------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | | |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-14 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .18 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

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TABLE 9.3. (Continued)

| ESC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF SEPT. | | NUMBER OBS. 570 | | SUMMARY 33 | | ZERO CROSS | | ZERO TOTAL | |
|----------------|-------------|-------------------------|-------------|----------------|-------------|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| LIMITS | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 |
| PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES |
| 1 TO 5 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ESC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF SEPT. | | NUMBER OBS. 570 | | SUMMARY 33 | | ZERO CROSS | | ZERO TOTAL | |
| LIMITS | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 |
| PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES |
| 1 TO 5 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ESC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF SEPT. | | NUMBER OBS. 577 | | SUMMARY 33 | | ZERO CROSS | | ZERO TOTAL | |
| LIMITS | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 | 1 TO 5 TO 9 |
| PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES |
| 1 TO 5 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

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TABLE 9.3. (Concluded)

| KSC PEAK WINDS | | | | | | | | | | | | | | | | | |
|---|------|-----|-----|---|-----|-----|-----|---|-------|-------|------|------|-----|-----|-----|------|-------|
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | |
| MONTH OF SEPT. | | | | | | | | | | | | | | | | | |
| NUMBER OPS. 570 | | | | | | | | | | | | | | | | | |
| HOUR 21 | | | | HOUR 22 | | | | HOUR 23 | | | | | | | | | |
| RUNWAY 15 | | | | RUNWAY 15 | | | | RUNWAY 15 | | | | | | | | | |
| *** CROSSWIND LIMITS *** | | | | *** CROSSWIND LIMITS *** | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | |
| PERCENTAGES | | | | PERCENTAGES | | | | PERCENTAGES | | | | | | | | | |
| TAILWIND LIMITS | | | | TAILWIND LIMITS | | | | TAILWIND LIMITS | | | | | | | | | |
| 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | |
| TOTAL | | | | TOTAL | | | | TOTAL | | | | | | | | | |
| ZERO CROSS | | | | ZERO CROSS | | | | ZERO CROSS | | | | | | | | | |
| UP | | | | UP | | | | UP | | | | | | | | | |
| TOTAL | | | | TOTAL | | | | TOTAL | | | | | | | | | |
| .70 | .70 | .70 | .70 | .00 | .00 | .00 | .00 | 1.23 | .35 | .35 | .35 | .00 | .00 | .00 | .00 | 2.63 | 22.63 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.23 | .35 | .35 | .35 | .00 | .00 | .00 | .00 | .35 | 40.35 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .35 | .70 | .70 | .70 | .00 | .00 | .00 | .00 | .18 | 32.98 |
| .70 | 1.50 | .70 | .18 | .00 | .00 | .00 | .00 | 2.91 | 56.67 | 32.31 | 3.51 | .18 | .18 | .18 | .18 | 3.16 | 95.96 |
| KSC PEAK WINDS | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | |
| MONTH OF SEPT. | | | | | | | | | | | | | | | | | |
| NUMBER OPS. 570 | | | | | | | | | | | | | | | | | |
| HOUR 21 | | | | HOUR 22 | | | | HOUR 23 | | | | | | | | | |
| RUNWAY 33 | | | | RUNWAY 33 | | | | RUNWAY 33 | | | | | | | | | |
| *** CROSSWIND LIMITS *** | | | | *** CROSSWIND LIMITS *** | | | | *** CROSSWIND LIMITS *** | | | | | | | | | |
| 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | |
| PERCENTAGES | | | | PERCENTAGES | | | | PERCENTAGES | | | | | | | | | |
| TAILWIND LIMITS | | | | TAILWIND LIMITS | | | | TAILWIND LIMITS | | | | | | | | | |
| 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 25- UP | | | | | | | | | |
| TOTAL | | | | TOTAL | | | | TOTAL | | | | | | | | | |
| ZERO CROSS | | | | ZERO CROSS | | | | ZERO CROSS | | | | | | | | | |
| UP | | | | UP | | | | UP | | | | | | | | | |
| TOTAL | | | | TOTAL | | | | TOTAL | | | | | | | | | |
| .70 | .70 | .70 | .70 | .00 | .00 | .00 | .00 | 2.98 | 20.88 | 1.23 | .18 | .00 | .00 | .00 | .00 | 2.28 | 24.74 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .70 | 35.09 | 2.46 | .35 | .18 | .00 | .00 | .00 | 1.40 | 39.47 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .53 | .53 | 26.32 | 2.11 | .00 | .00 | .00 | .00 | .18 | 30.18 |
| .70 | 1.50 | .70 | .18 | .00 | .00 | .00 | .00 | 4.21 | 56.49 | 30.00 | 2.63 | 1.05 | .18 | .18 | .18 | 3.06 | 94.39 |

TABLE 9.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| MPS | MSE PEAK WINDS | | | | MSE PEAK WINDS | | | | MSE PEAK WINDS | | | | |
|-------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | 15 000 | | 33 000 | | 15 000 | | 33 000 | | 15 000 | | 33 000 | | |
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 70-02 | 3.87 | 1.07 | 1.99 | 1.93 | 6.15 | 6.80 | 3.10 | 3.69 | 47.75 | 47.75 | 47.75 | 47.75 | 47.75 |
| 71-02 | 3.98 | 2.46 | 1.52 | 2.54 | 4.15 | 4.57 | 3.57 | 5.10 | 45.52 | 45.52 | 45.52 | 45.52 | 45.52 |
| 76-04 | 6.62 | 3.16 | 3.46 | 3.33 | 7.10 | 10.13 | 6.21 | 3.93 | 73.10 | 73.10 | 73.10 | 73.10 | 73.10 |
| 79-11 | 2.75 | 1.00 | 1.76 | 1.02 | 6.18 | 3.05 | 1.82 | 1.23 | 63.27 | 63.27 | 63.27 | 63.27 | 63.27 |
| 12-14 | 2.11 | 1.00 | 1.11 | 1.07 | 5.88 | 2.46 | 1.41 | 1.05 | 58.54 | 58.54 | 58.54 | 58.54 | 58.54 |
| 15-17 | 1.70 | .64 | .64 | 1.07 | 6.74 | 1.87 | .64 | 1.23 | 40.74 | 40.74 | 40.74 | 40.74 | 40.74 |
| 17-20 | 2.64 | 1.41 | 1.23 | 1.45 | 5.62 | 3.22 | 1.46 | 1.76 | 39.68 | 39.68 | 39.68 | 39.68 | 39.68 |
| 21-23 | 3.40 | 1.54 | 1.82 | 1.64 | 5.24 | 5.33 | 2.58 | 2.75 | 55.70 | 55.70 | 55.70 | 55.70 | 55.70 |
| 20-27 | 3.38 | 1.69 | 1.69 | 1.74 | 5.76 | 5.19 | 2.60 | 2.69 | 54.70 | 54.70 | 54.70 | 54.70 | 54.70 |

9AA

9AB

| MPS | MSE PEAK WINDS | | | | MSE PEAK WINDS | | | | MSE PEAK WINDS | | | | |
|-------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | 15 000 | | 33 000 | | 15 000 | | 33 000 | | 15 000 | | 33 000 | | |
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 70-02 | 1.27 | .54 | .70 | 1.93 | 1.93 | 27.03 | 15.22 | 4.50 | 47.75 | 47.75 | 47.75 | 47.75 | 47.75 |
| 71-02 | 1.94 | .60 | .70 | 2.54 | 2.54 | 30.60 | 11.94 | 2.99 | 45.52 | 45.52 | 45.52 | 45.52 | 45.52 |
| 76-04 | 3.54 | 1.36 | .43 | 3.33 | 3.33 | 31.72 | 30.34 | 11.03 | 73.10 | 73.10 | 73.10 | 73.10 | 73.10 |
| 79-11 | .56 | .54 | .42 | 1.02 | 1.02 | 8.16 | 10.20 | 44.90 | 63.27 | 63.27 | 63.27 | 63.27 | 63.27 |
| 12-14 | .06 | .48 | .46 | 1.02 | 1.02 | 7.32 | 7.32 | 43.90 | 58.54 | 58.54 | 58.54 | 58.54 | 58.54 |
| 15-17 | .16 | .24 | .65 | 1.07 | 1.07 | 14.81 | 3.70 | 22.22 | 40.74 | 40.74 | 40.74 | 40.74 | 40.74 |
| 17-20 | .60 | .54 | .30 | 1.45 | 1.45 | 17.46 | 11.11 | 11.11 | 39.68 | 39.68 | 39.68 | 39.68 | 39.68 |
| 21-23 | 1.73 | .42 | .18 | 1.64 | 1.64 | 25.32 | 17.72 | 12.66 | 55.70 | 55.70 | 55.70 | 55.70 | 55.70 |
| 20-27 | .83 | .59 | .32 | 1.74 | 1.74 | 24.50 | 16.64 | 13.56 | 54.70 | 54.70 | 54.70 | 54.70 | 54.70 |

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TABLE 9.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY CLASS (440075) | MIS BEAR WINDS | | HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF SEPT. | | 09-11 | | 12-14 | | 15-17 | | 09-11 | | 12-14 | | 15-17 | | 06-17 | |
|-----------------------------|----------------|--------------|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF |
| 1 | 8-11 | 1-50 | -12 | 2-51 | 10-20 | 17-07 | 29-39 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 2 | 13-08 | 2-10 | -59 | 3-73 | 10-20 | 17-07 | 29-39 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 3 | 15-53 | 2-46 | 1-01 | 5-20 | 12-24 | 19-51 | 46-18 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 4 | 26-12 | 3-20 | 1-91 | 8-12 | 18-37 | 29-51 | 53-05 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 5 | 38-20 | 4-58 | 2-85 | 10-86 | 34-69 | 49-51 | 58-90 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 6 | 43-09 | 6-20 | 4-69 | 14-86 | 51-02 | 64-39 | 64-12 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 7 | 52-23 | 13-09 | 4-06 | 18-37 | 55-10 | 74-41 | 67-18 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 8 | 56-42 | 19-33 | 6-26 | 22-85 | 67-35 | 81-46 | 73-28 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 9 | 62-58 | 27-19 | 9-96 | 28-74 | 75-51 | 83-90 | 77-10 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 10 | 72-59 | 40-24 | 74-58 | 42-80 | 83-67 | 91-22 | 81-30 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 11 | 77-75 | 54-74 | 36-99 | 52-99 | 95-71 | 97-04 | 83-59 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 12 | 81-34 | 62-12 | 46-72 | 60-60 | 97-31 | 98-10 | 85-50 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 13 | 85-49 | 71-67 | 59-67 | 70-29 | 100-00 | 100-00 | 91-22 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 14 | 87-95 | 77-37 | 67-31 | 75-81 | 93-84 | 93-84 | 91-22 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 15 | 85-98 | 82-17 | 74-24 | 80-83 | 95-97 | 95-97 | 93-51 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 16 | 82-19 | 85-71 | 78-10 | 84-93 | 97-96 | 97-96 | 96-18 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 17 | 84-22 | 88-94 | 82-52 | 87-64 | 97-96 | 97-96 | 97-71 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 18 | 85-14 | 90-88 | 86-69 | 90-24 | 100-00 | 100-00 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 19 | 86-13 | 94-14 | 91-16 | 92-89 | 92-89 | 92-89 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 20 | 86-74 | 95-98 | 93-91 | 95-40 | 95-40 | 95-40 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 21 | 97-30 | 96-40 | 95-90 | 96-23 | 96-23 | 96-23 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 22 | 97-60 | 97-36 | 96-24 | 96-73 | 96-73 | 96-73 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 23 | 97-91 | 97-60 | 96-50 | 97-27 | 97-27 | 97-27 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 24 | 98-16 | 97-84 | 97-50 | 97-74 | 97-74 | 97-74 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 25 | 98-46 | 98-14 | 97-32 | 97-92 | 97-92 | 97-92 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 26 | 98-52 | 98-32 | 97-32 | 98-16 | 98-16 | 98-16 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 27 | 98-65 | 98-50 | 97-85 | 98-52 | 98-52 | 98-52 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 28 | 98-71 | 98-50 | 98-03 | 98-34 | 98-34 | 98-34 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 29 | 98-71 | 98-50 | 98-15 | 98-51 | 98-51 | 98-51 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 30 | 98-71 | 98-50 | 98-57 | 98-99 | 98-99 | 98-99 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 31 | 98-96 | 98-96 | 98-75 | 99-17 | 99-17 | 99-17 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 32 | 98-96 | 99-10 | 99-11 | 99-17 | 99-17 | 99-17 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 33 | 99-08 | 99-34 | 99-22 | 99-29 | 99-29 | 99-29 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 34 | 99-14 | 99-34 | 99-34 | 99-49 | 99-49 | 99-49 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 35 | 99-32 | 99-46 | 99-40 | 99-47 | 99-47 | 99-47 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 36 | 99-45 | 99-56 | 99-46 | 99-52 | 99-52 | 99-52 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 37 | 99-57 | 99-54 | 99-54 | 99-62 | 99-62 | 99-62 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 38 | 99-63 | 99-70 | 99-59 | 99-67 | 99-67 | 99-67 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 39 | 99-59 | 99-74 | 99-70 | 99-74 | 99-74 | 99-74 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 40 | 99-74 | 99-82 | 99-76 | 99-79 | 99-79 | 99-79 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 41 | 99-75 | 99-82 | 99-76 | 99-82 | 99-82 | 99-82 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 42 | 99-82 | 99-84 | 99-76 | 99-82 | 99-82 | 99-82 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 43 | 99-88 | 99-94 | 99-76 | 99-85 | 99-85 | 99-85 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 44 | 99-94 | 99-94 | 99-82 | 99-88 | 99-88 | 99-88 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 45 | 99-94 | 99-94 | 99-82 | 99-88 | 99-88 | 99-88 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 46 | 100-00 | 100-00 | 94-82 | 99-88 | 99-88 | 99-88 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 47 | 99-94 | 99-94 | 99-88 | 99-94 | 99-94 | 99-94 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 48 | 99-94 | 99-94 | 99-88 | 99-94 | 99-94 | 99-94 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 49 | 99-94 | 99-94 | 99-88 | 99-94 | 99-94 | 99-94 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 50 | 99-94 | 99-94 | 99-88 | 99-94 | 99-94 | 99-94 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 51 | 100-00 | 100-00 | 100-00 | 100-00 | 100-00 | 100-00 | 98-85 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| MOVS | 1627 | 1666 | 1676 | 1683 | 1683 | 1683 | 665 | 0 | 145 | 49 | 41 | 77 | 202 | | | | | |

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TABLE 10.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| HRS | MSC PEAK WINDS MONTH OF OCT. | | | | | TOTAL NUMBER OBS. |
|-------|------------------------------|-------|-------|--------|--------------------------------------|-------------------|
| | CROSSWIND | | | | | |
| | 1 | 10 | 4 | 5 TO 9 | ***** CRITICAL LIMITS IN KNOTS ***** | |
| 10-02 | 50.14 | 38.09 | 5.66 | .85 | 17 | 1767 |
| 12-05 | 53.48 | 35.77 | 5.04 | .91 | 06 | 1767 |
| 14-08 | 47.88 | 39.90 | 6.85 | .96 | 23 | 1767 |
| 16-11 | 26.60 | 56.71 | 10.98 | 3.34 | .68 | 1767 |
| 17-14 | 18.51 | 65.08 | 11.15 | 3.06 | .91 | 1767 |
| 18-17 | 28.35 | 50.18 | 9.90 | 1.64 | .45 | 1767 |
| 19-20 | 46.41 | 41.03 | 8.66 | .62 | .40 | 1767 |
| 21-23 | 47.93 | 39.62 | 7.75 | .74 | .23 | 1767 |
| 22-24 | 39.91 | 46.40 | 8.25 | 1.51 | .42 | 14136 |

TABLE 10.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| HRS | MSC PEAK WINDS MONTH OF OCT. | | | | | TOTAL NUMBER OBS. |
|-------|------------------------------|------|------|--------|--------------------------------------|-------------------|
| | TAILWIND | | | | | |
| | 1 | 10 | 4 | 5 TO 9 | ***** CRITICAL LIMITS IN KNOTS ***** | |
| 10-02 | 2.38 | 1.70 | .40 | .40 | 17 | 1767 |
| 12-05 | 3.28 | 1.53 | .34 | .34 | 06 | 1767 |
| 14-08 | 3.00 | 1.47 | .34 | .34 | 23 | 1767 |
| 16-11 | .79 | 3.96 | 1.70 | 1.70 | .68 | 1767 |
| 17-14 | .11 | 2.83 | 2.83 | 2.83 | .91 | 1767 |
| 18-17 | .45 | 1.58 | 2.43 | 2.43 | .45 | 1767 |
| 19-20 | 2.72 | 2.21 | 1.25 | 1.25 | .40 | 1767 |
| 21-23 | 3.34 | 2.21 | .51 | .51 | .23 | 1767 |
| 22-24 | 2.01 | 2.19 | 1.22 | 1.22 | .42 | 14136 |

TABLE 10.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|-----------------|--------|--------|----------|----------|----------|--------|------|-------|-------|
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | | | | | |
| HOUR 0 | | NUMBER OBS. 589 | | | | | NUMBER OBS. 589 | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | | | |
| ZERO CROSS | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | | | |
| 1 TO 4 | 2.04 | .00 | .00 | .00 | .00 | .00 | 3.23 | 16.13 | 1.36 | .17 | .00 | .00 | .00 | .00 | 1.36 | 19.02 |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | 1.70 | 31.24 | 1.19 | .08 | .17 | .00 | .00 | .00 | .51 | 33.11 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .51 | .68 | 33.96 | 5.43 | .17 | .00 | .00 | .00 | .00 | 40.24 |
| TOTAL | 2.04 | .00 | .00 | .00 | .00 | .00 | 5.43 | 48.05 | 36.50 | 5.60 | .34 | .00 | .00 | 1.87 | 92.36 | |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | | | | | |
| HOUR 1 | | NUMBER OBS. 589 | | | | | NUMBER OBS. 589 | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | | | |
| 1 TO 4 | .68 | .34 | .00 | .00 | .00 | .00 | 1.02 | 16.94 | 2.38 | .34 | .17 | .00 | .00 | 1.36 | 21.56 | |
| 5 TO 9 | .00 | 1.36 | .34 | .00 | .00 | .00 | 2.04 | 31.07 | .68 | .00 | .00 | .00 | .00 | .85 | 32.60 | |
| 10- UP | .00 | .00 | .34 | .00 | .00 | .00 | .34 | .85 | 34.13 | 4.24 | .17 | .00 | .00 | .00 | 39.56 | |
| TOTAL | .68 | 1.70 | .68 | .34 | .00 | .00 | 3.40 | 48.97 | 37.18 | 4.58 | .34 | .00 | .00 | 2.21 | 93.72 | |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | | | | | |
| HOUR 2 | | NUMBER OBS. 589 | | | | | NUMBER OBS. 589 | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | | | |
| 1 TO 4 | 2.04 | .85 | .00 | .00 | .00 | .00 | 2.89 | 15.28 | 2.04 | .51 | .00 | .00 | .00 | 2.38 | 20.71 | |
| 5 TO 9 | .00 | .51 | .34 | .00 | .00 | .00 | 1.36 | 32.26 | .34 | .17 | .00 | .00 | .00 | .68 | 33.95 | |
| 10- UP | .00 | .00 | .17 | .00 | .00 | .00 | .34 | 1.19 | 32.60 | 4.07 | .34 | .00 | .00 | .17 | 38.37 | |
| TOTAL | 2.04 | 1.36 | .68 | .34 | .00 | .00 | 4.58 | 48.73 | 34.97 | 4.75 | .85 | .00 | .00 | 3.23 | 92.53 | |

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TABLE 10.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | KSC PEAK WINDS | | | |
|-----------------|------|-------------------------|--------|----------|----------|----------|--------------------|--------|--------|----------|----------|-----------------|-------|------------|-------|
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | MONTH OF OCT. | | | |
| HOUR 3 | | HOUR 3 | | | | | | | | | | HOUR 5 | | | |
| NUMBER OBS. 5P9 | | NUMBER OBS. 5P9 | | | | | | | | | | NUMBER OBS. 5P9 | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | |
| | | CROSSWIND LIMITS % | | | | | CROSSWIND LIMITS % | | | | | | | | |
| | | 1 TO 5 | 5 TO 9 | 10 TO 15 | 15 TO 19 | 20 TO 24 | 25-UP | 1 TO 5 | 5 TO 9 | 10 TO 15 | 15 TO 19 | 20 TO 24 | 25-UP | ZERO CROSS | TOTAL |
| | | PERCENTAGES | | | | | | | | | | | | | |
| 1 TO 4 | 2.38 | .68 | .00 | .00 | .00 | .00 | .00 | 16.94 | 2.38 | .51 | .14 | .00 | .00 | 2.04 | 22.24 |
| 5 TO 9 | .00 | 1.19 | .68 | .00 | .00 | .00 | .00 | 31.24 | 1.19 | .00 | .17 | .00 | .00 | .85 | 33.45 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .84 | .84 | 21.24 | 3.23 | .00 | .00 | .17 | 35.48 |
| TOTAL | 2.38 | 1.87 | .68 | .00 | .00 | .00 | .00 | 49.07 | 34.80 | 3.74 | .51 | .00 | .00 | 3.06 | 91.17 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | KSC PEAK WINDS | | | |
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | MONTH OF OCT. | | | |
| HOUR 4 | | HOUR 4 | | | | | | | | | | HOUR 5 | | | |
| NUMBER OBS. 5P9 | | NUMBER OBS. 5P9 | | | | | | | | | | NUMBER OBS. 5P9 | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | |
| | | CROSSWIND LIMITS % | | | | | CROSSWIND LIMITS % | | | | | | | | |
| | | 1 TO 5 | 5 TO 9 | 10 TO 15 | 15 TO 19 | 20 TO 24 | 25-UP | 1 TO 5 | 5 TO 9 | 10 TO 15 | 15 TO 19 | 20 TO 24 | 25-UP | ZERO CROSS | TOTAL |
| | | PERCENTAGES | | | | | | | | | | | | | |
| 1 TO 4 | 2.72 | 1.22 | .00 | .00 | .00 | .00 | .00 | 17.15 | 2.04 | .51 | .34 | .00 | .00 | 2.21 | 22.24 |
| 5 TO 9 | .00 | .34 | .68 | .00 | .00 | .00 | .00 | 35.44 | .68 | .00 | .00 | .00 | .00 | .34 | 36.50 |
| 10-UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .34 | 30.22 | 3.74 | .17 | .00 | .00 | .00 | 34.47 |
| TOTAL | 2.72 | 1.36 | 1.02 | .34 | .00 | .00 | .00 | 52.97 | 35.94 | 4.24 | .51 | .00 | .00 | 2.55 | 93.21 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | KSC PEAK WINDS | | | |
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | MONTH OF OCT. | | | |
| HOUR 5 | | HOUR 5 | | | | | | | | | | HOUR 5 | | | |
| NUMBER OBS. 5P9 | | NUMBER OBS. 5P9 | | | | | | | | | | NUMBER OBS. 5P9 | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | |
| | | CROSSWIND LIMITS % | | | | | CROSSWIND LIMITS % | | | | | | | | |
| | | 1 TO 5 | 5 TO 9 | 10 TO 15 | 15 TO 19 | 20 TO 24 | 25-UP | 1 TO 5 | 5 TO 9 | 10 TO 15 | 15 TO 19 | 20 TO 24 | 25-UP | ZERO CROSS | TOTAL |
| | | PERCENTAGES | | | | | | | | | | | | | |
| 1 TO 4 | 2.04 | 1.02 | .00 | .00 | .00 | .00 | .00 | 16.64 | 3.40 | 1.02 | .34 | .17 | .00 | 1.53 | 23.09 |
| 5 TO 9 | .00 | .68 | .17 | .17 | .00 | .00 | .00 | 33.94 | .85 | .17 | .00 | .00 | .00 | .34 | 35.31 |
| 10-UP | .00 | .00 | .00 | .17 | .00 | .00 | .00 | .68 | 30.39 | 3.90 | .00 | .00 | .00 | .00 | 34.97 |
| TOTAL | 2.04 | 1.70 | .17 | .34 | .00 | .00 | .00 | 51.27 | 34.63 | 5.04 | .34 | .17 | .00 | 1.87 | 93.38 |

TABLE 10.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | KSC PEAK WINDS | |
|-----------------|------|--------------------------|------|-----|-----|------|--------------------------|-------|------|------|-----|-----------------|-------|
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | MONTH OF OCT. | |
| HOUR 6 | | HOUR 6 | | | | | | | | | | HOUR 7 | |
| NUMBER OBS. 589 | | NUMBER OBS. 589 | | | | | | | | | | NUMBER OBS. 589 | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | |
| TAILWIND LIMITS | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | ZERO CROSS | |
| 1 TO 4 | | 5 TO 9 | | | | | 1 TO 4 | | | | | 5 TO 9 | |
| 5 TO 9 | | 10 TO 14 | | | | | 15 TO 19 | | | | | 20 TO 24 | |
| 10-UP | | PERCENTAGES | | | | | PERCENTAGES | | | | | 25-UP | |
| TOTAL | | | | | | | | | | | | TOTAL | |
| 1 TO 4 | 2.21 | 1.19 | .00 | .00 | .00 | 3.40 | 18.17 | 2.72 | 1.53 | .17 | .00 | 2.38 | 25.13 |
| 5 TO 9 | .30 | .68 | .17 | .00 | .00 | .85 | 31.24 | 1.36 | .34 | .00 | .17 | 33.11 | |
| 10-UP | .00 | .00 | .17 | .00 | .00 | .17 | .68 | 29.03 | 4.92 | .00 | .00 | 34.63 | |
| TOTAL | 2.21 | 1.87 | .17 | .00 | .00 | 4.41 | 50.08 | 33.11 | 6.79 | .17 | .00 | 2.55 | 92.87 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | KSC PEAK WINDS | |
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | MONTH OF OCT. | |
| HOUR 7 | | HOUR 6 | | | | | | | | | | HOUR 7 | |
| NUMBER OBS. 589 | | NUMBER OBS. 589 | | | | | | | | | | NUMBER OBS. 589 | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | |
| TAILWIND LIMITS | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | ZERO CROSS | |
| 1 TO 4 | | 5 TO 9 | | | | | 1 TO 4 | | | | | 5 TO 9 | |
| 5 TO 9 | | 10 TO 14 | | | | | 15 TO 19 | | | | | 20 TO 24 | |
| 10-UP | | PERCENTAGES | | | | | PERCENTAGES | | | | | 25-UP | |
| TOTAL | | | | | | | | | | | | TOTAL | |
| 1 TO 4 | 1.19 | 1.02 | .00 | .00 | .00 | 2.21 | 19.52 | 3.23 | .68 | .34 | .00 | 1.53 | 25.30 |
| 5 TO 9 | .00 | .34 | .85 | .68 | .00 | 1.87 | 29.71 | .17 | .00 | .17 | .00 | .34 | 30.39 |
| 10-UP | .00 | .00 | .34 | .00 | .00 | .34 | .34 | 32.94 | 4.07 | .00 | .17 | .17 | 37.69 |
| TOTAL | 1.19 | 1.36 | 1.19 | .68 | .00 | 4.41 | 49.58 | 36.33 | 4.75 | .51 | .17 | 2.04 | 93.38 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | KSC PEAK WINDS | |
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | MONTH OF OCT. | |
| HOUR 6 | | HOUR 6 | | | | | | | | | | HOUR 6 | |
| NUMBER OBS. 589 | | NUMBER OBS. 589 | | | | | | | | | | NUMBER OBS. 589 | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | |
| TAILWIND LIMITS | | *** CROSSWIND LIMITS *** | | | | | *** CROSSWIND LIMITS *** | | | | | ZERO CROSS | |
| 1 TO 4 | | 5 TO 9 | | | | | 1 TO 4 | | | | | 5 TO 9 | |
| 5 TO 9 | | 10 TO 14 | | | | | 15 TO 19 | | | | | 20 TO 24 | |
| 10-UP | | PERCENTAGES | | | | | PERCENTAGES | | | | | 25-UP | |
| TOTAL | | | | | | | | | | | | TOTAL | |
| 1 TO 4 | 1.53 | 1.87 | .00 | .00 | .00 | 3.40 | 8.32 | 2.72 | 1.36 | .85 | .34 | 1.19 | 14.77 |
| 5 TO 9 | .00 | .68 | .34 | .00 | .00 | 1.70 | 38.85 | .85 | .00 | .00 | .00 | .68 | 31.50 |
| 10-UP | .00 | .00 | .51 | .00 | .00 | .51 | .68 | 40.92 | 5.09 | .17 | .00 | .00 | 46.86 |
| TOTAL | 1.53 | 2.55 | 1.19 | .34 | .00 | 5.60 | 39.05 | 44.40 | 6.45 | 1.02 | .34 | 1.87 | 93.21 |

TABLE 10.3. (Continued)

| KSC PEAK WINDS MONTH OF OCT. | | | | | | | | | | | | | | | |
|------------------------------|--------|----------|----------|----------|-----------------------------|------------|-------|--------|--------|-----------------------------|----------|----------|-------|------------|-------|
| NOV 9 | | | | | NUMBER OBS. 589 | | | | | SUNDAY 11 | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | TAILWINDS VS CROSSWINDS | | | | | TAILWINDS VS CROSSWINDS | | | | | |
| MONTH OF OCT. | | | | | MONTH OF OCT. | | | | | MONTH OF OCT. | | | | | |
| TAILWIND LIMITS PERCENTAGES | | | | | TAILWIND LIMITS PERCENTAGES | | | | | TAILWIND LIMITS PERCENTAGES | | | | | |
| 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25-UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25-UP | ZERO CROSS | TOTAL |
| .38 | .85 | .00 | .00 | .00 | .00 | .00 | 1.19 | 1.74 | 2.38 | 1.02 | 1.36 | .00 | .00 | .17 | 8.66 |
| .00 | 1.02 | 1.36 | 1.19 | .00 | .00 | .00 | 3.57 | 28.83 | .34 | .17 | .34 | .00 | .00 | .17 | 27.84 |
| .00 | .00 | .17 | .17 | .17 | .17 | .00 | 1.75 | .68 | 49.92 | 5.95 | .00 | .00 | .00 | .00 | 56.54 |
| .34 | 1.87 | 2.21 | 1.36 | .17 | .17 | .00 | 6.11 | 31.24 | 51.61 | 8.15 | 1.70 | .00 | .00 | .34 | 91.00 |
| KSC PEAK WINDS MONTH OF OCT. | | | | | | | | | | | | | | | |
| NOV 10 | | | | | NUMBER OBS. 589 | | | | | SUNDAY 11 | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | TAILWINDS VS CROSSWINDS | | | | | TAILWINDS VS CROSSWINDS | | | | | |
| MONTH OF OCT. | | | | | MONTH OF OCT. | | | | | MONTH OF OCT. | | | | | |
| TAILWIND LIMITS PERCENTAGES | | | | | TAILWIND LIMITS PERCENTAGES | | | | | TAILWIND LIMITS PERCENTAGES | | | | | |
| 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25-UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25-UP | ZERO CROSS | TOTAL |
| .51 | .68 | .00 | .00 | .00 | .00 | .00 | 1.19 | 1.70 | 1.53 | 1.36 | .00 | .00 | .17 | .00 | 6.11 |
| .00 | 1.36 | 1.87 | 1.87 | .00 | .00 | .00 | 4.24 | 23.99 | 1.36 | .34 | .00 | .00 | .00 | .17 | 25.64 |
| .00 | .00 | .00 | .17 | .17 | .17 | .00 | 1.53 | .68 | 52.76 | 6.49 | .00 | .00 | .00 | .00 | 59.93 |
| .51 | 2.04 | 2.55 | 1.70 | .17 | .17 | .00 | 6.96 | 25.47 | 57.65 | 10.19 | 1.70 | .00 | .17 | .51 | 91.60 |
| KSC PEAK WINDS MONTH OF OCT. | | | | | | | | | | | | | | | |
| NOV 11 | | | | | NUMBER OBS. 589 | | | | | SUNDAY 11 | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | TAILWINDS VS CROSSWINDS | | | | | TAILWINDS VS CROSSWINDS | | | | | |
| MONTH OF OCT. | | | | | MONTH OF OCT. | | | | | MONTH OF OCT. | | | | | |
| TAILWIND LIMITS PERCENTAGES | | | | | TAILWIND LIMITS PERCENTAGES | | | | | TAILWIND LIMITS PERCENTAGES | | | | | |
| 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25-UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25-UP | ZERO CROSS | TOTAL |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .68 | 1.53 | .51 | .00 | .00 | .00 | 3.90 |
| .00 | .68 | 1.36 | 1.70 | .34 | .00 | .00 | 4.07 | 25.71 | 1.53 | .00 | .17 | .00 | .00 | .51 | 22.92 |
| .00 | .00 | .17 | .17 | .17 | .17 | .00 | 2.71 | .85 | 57.22 | 6.79 | .51 | .34 | .00 | .00 | 65.70 |
| .00 | .68 | 2.55 | 2.21 | .85 | .00 | .00 | 6.28 | 22.24 | 60.27 | 7.30 | 1.36 | .85 | .00 | .51 | 92.53 |

TABLE 10.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | |
|--------------------------|--------|--------------------------|----------|----------|----------|--------|------------|-------|--------|--------|----------|----------|----------|--------|------------|-------|
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | | | | | |
| HOUR 12 | | NUMBER OBS. 589 | | | | | | | | | | | | | | |
| RUNWAY 15 | | RUNWAY 33 | | | | | | | | | | | | | | |
| *** CROSSWIND LIMITS *** | | *** CROSSWIND LIMITS *** | | | | | | | | | | | | | | |
| PERCENTAGES | | PERCENTAGES | | | | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .17 | .17 | .00 | .00 | .00 | .00 | .00 | .34 | .68 | .68 | .85 | .34 | .51 | .00 | .00 | 3.06 |
| 5 TO 9 | .00 | 1.14 | .00 | .00 | .00 | .00 | .00 | 3.40 | 17.32 | 1.02 | .34 | .00 | .00 | .00 | .00 | 19.19 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.06 | .68 | 59.42 | 9.34 | .34 | .17 | .00 | .00 | 70.12 |
| TOTAL | .17 | 1.36 | 2.04 | 2.09 | .00 | .34 | .00 | 6.79 | 10.68 | 61.12 | 10.53 | .05 | .68 | .00 | .51 | 92.36 |
| KSC PEAK WINDS | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | |
| MONTH OF OCT. | | | | | | | | | | | | | | | | |
| HOUR 13 | | | | | | | | | | | | | | | | |
| NUMBER OBS. 589 | | | | | | | | | | | | | | | | |
| RUNWAY 15 | | | | | | | | | | | | | | | | |
| *** CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .34 | .17 | .17 | .17 | .00 | 1.53 |
| 5 TO 9 | .00 | .85 | .85 | 1.53 | .17 | .00 | .00 | 3.40 | 18.34 | 2.04 | .17 | .17 | .17 | .00 | .00 | 21.22 |
| 10- UP | .00 | .00 | 1.53 | .85 | .34 | .17 | .00 | 2.89 | .68 | 61.12 | 8.32 | .51 | .00 | .00 | .00 | 70.63 |
| TOTAL | .00 | .85 | 2.38 | 2.38 | .51 | .17 | .00 | 6.28 | 19.02 | 63.50 | 8.66 | 1.19 | .34 | .34 | .34 | 93.38 |
| KSC PEAK WINDS | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | |
| MONTH OF OCT. | | | | | | | | | | | | | | | | |
| HOUR 14 | | | | | | | | | | | | | | | | |
| NUMBER OBS. 589 | | | | | | | | | | | | | | | | |
| RUNWAY 15 | | | | | | | | | | | | | | | | |
| *** CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .51 | .17 | .17 | .17 | .00 | 1.36 |
| 5 TO 9 | .00 | .68 | .00 | .05 | .17 | .00 | .00 | 1.70 | 17.00 | 1.19 | .34 | .17 | .00 | .00 | .00 | 19.19 |
| 10- UP | .00 | .00 | 1.02 | .34 | .85 | .34 | .00 | 2.55 | .17 | 66.04 | 8.49 | .17 | .00 | .00 | .00 | 74.87 |
| TOTAL | .00 | .68 | 1.02 | 1.19 | 1.02 | .34 | .00 | 4.24 | 17.66 | 67.74 | 8.83 | .68 | .17 | .17 | .17 | 95.82 |

TABLE 10.3. (Continued)

| MSC PEAR WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|------------------|--------|----------|----------|----------|-------------|-------|-----|-------|
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | | | | |
| HOUR 15 | | NUMBER OBS. 589 | | | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | PUNWAY 15 | | | | | PUNWAY 33 | | | | | ZERO CROSS | TOTAL | | |
| | | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | | |
| PERCENTAGES | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | PERCENTAGES | | | |
| 1 TO 4 | .17 | .00 | .00 | .00 | .00 | .00 | .17 | .17 | .51 | .17 | .34 | .17 | .17 | .17 | 1.87 |
| 5 TO 9 | .00 | .34 | 1.02 | .00 | .00 | .00 | 1.70 | 2.21 | 2.21 | .34 | .00 | .00 | .00 | .00 | 23.26 |
| 10-UP | .00 | .00 | .00 | .51 | .00 | .00 | 2.21 | .17 | 62.31 | 7.81 | .00 | .00 | .00 | .00 | 70.29 |
| TOTAL | .17 | .34 | 1.36 | 1.19 | .51 | .00 | 6.01 | 20.84 | 65.03 | 8.32 | .34 | .34 | .17 | .34 | 95.42 |

| MSC PEAR WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|------------------|--------|----------|----------|----------|-------------|-------|-----|-------|
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | | | | |
| HOUR 16 | | NUMBER OBS. 589 | | | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | PUNWAY 15 | | | | | PUNWAY 33 | | | | | ZERO CROSS | TOTAL | | |
| | | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | | |
| PERCENTAGES | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | PERCENTAGES | | | |
| 1 TO 4 | .17 | .34 | .00 | .00 | .00 | .00 | .51 | .85 | .34 | .17 | .34 | .17 | .17 | .00 | 2.04 |
| 5 TO 9 | .00 | .34 | 1.02 | .00 | .00 | .00 | 1.70 | 2.21 | 2.21 | .34 | .00 | .00 | .00 | .00 | 27.47 |
| 10-UP | .00 | .00 | .00 | .51 | .00 | .00 | 2.04 | .85 | 55.86 | 8.66 | .17 | .00 | .00 | .00 | 65.53 |
| TOTAL | .17 | .69 | 1.02 | 1.02 | .34 | .00 | 6.24 | 26.66 | 58.00 | 9.17 | .51 | .34 | .17 | .34 | 95.25 |

| MSC PEAR WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
|-----------------|--------|-------------------------|--------|----------|----------|----------|------------------|--------|----------|----------|----------|-------------|-------|-----|-------|
| MONTH OF OCT. | | MONTH OF OCT. | | | | | | | | | | | | | |
| HOUR 17 | | NUMBER OBS. 589 | | | | | | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | PUNWAY 15 | | | | | PUNWAY 33 | | | | | ZERO CROSS | TOTAL | | |
| | | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | | |
| PERCENTAGES | | CROSSWIND LIMITS | | | | | CROSSWIND LIMITS | | | | | PERCENTAGES | | | |
| 1 TO 4 | .17 | .51 | .00 | .00 | .00 | .00 | .68 | 2.89 | 1.19 | .00 | .00 | .17 | .17 | .17 | 8.58 |
| 5 TO 9 | .00 | .34 | .68 | .00 | .00 | .00 | 1.36 | 33.79 | 2.89 | .34 | .00 | .00 | .00 | .00 | 37.01 |
| 10-UP | .00 | .00 | .00 | .51 | .00 | .00 | 3.06 | .34 | 45.16 | 7.13 | .00 | .00 | .00 | .00 | 52.63 |
| TOTAL | .17 | .85 | 2.38 | .85 | .51 | .00 | 5.39 | 37.01 | 49.28 | 7.47 | .17 | .00 | .17 | .17 | 99.23 |

TABLE 10.3. (Concluded)

| RSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
|----------------|------|-------------------------|--------|----------|----------|-------------|--------------------|--------|----------|-------------|----------|-----|------|-------|--|
| MONTH OF OCT. | | DUNBAR 15 | | | | | DUNBAR 33 | | | | | | | | |
| HOUR | WIND | CROSSWIND LIMITS % | | | | | CROSSWIND LIMITS % | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | | |
| 2021 | 589 | 2.72 | 1.45 | .00 | .00 | .00 | 3.57 | 15.31 | 1.02 | .17 | .17 | .00 | 1.19 | 17.83 | |
| 2022 | 589 | .00 | 2.39 | .68 | .00 | .00 | 3.06 | 28.86 | 1.70 | .00 | .17 | .00 | .51 | 31.24 | |
| 2023 | 589 | .00 | .00 | .51 | .34 | .17 | 1.02 | .34 | 34.30 | 6.79 | .17 | .00 | .00 | 41.60 | |
| TOTAL | | 2.72 | 3.83 | 1.19 | .34 | .17 | 7.64 | 44.31 | 37.01 | 6.96 | .51 | .17 | 1.70 | 97.66 | |
| HOUR 21 | | NUMBER OBS. | | 589 | | NUMBER OBS. | | 589 | | NUMBER OBS. | | 589 | | 589 | |
| HOUR 22 | | NUMBER OBS. | | 589 | | NUMBER OBS. | | 589 | | NUMBER OBS. | | 589 | | 589 | |
| HOUR 23 | | NUMBER OBS. | | 589 | | NUMBER OBS. | | 589 | | NUMBER OBS. | | 589 | | 589 | |

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TABLE 10.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| HRS | KSC PEAK WINDS | | | | HEAD/TAIL WIND REVERSALS | | | | MONTH OF OCT. | | | | |
|-------|----------------------|----------------------|----------------------|----------------------|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 4.92 | 2.27 | 2.15 | 2.37 | 4.10 | 3.00 | 3.40 | 42.06 | 3.66 | 3.00 | 3.40 | 42.06 | 3.66 |
| 03-05 | 4.65 | 2.19 | 2.55 | 2.21 | 4.45 | 3.40 | 2.83 | 45.80 | 3.06 | 3.40 | 2.83 | 45.80 | 3.06 |
| 06-08 | 7.14 | 3.85 | 3.29 | 4.07 | 6.24 | 4.54 | 4.42 | 66.12 | 4.75 | 4.54 | 4.42 | 66.12 | 4.75 |
| 09-11 | 6.39 | 4.31 | 4.08 | 4.71 | 6.16 | 4.92 | 4.71 | 58.65 | 5.09 | 4.92 | 4.71 | 58.65 | 5.09 |
| 12-14 | 5.67 | 2.38 | 3.29 | 2.53 | 5.86 | 3.46 | 2.44 | 54.95 | 2.60 | 3.46 | 2.44 | 54.95 | 2.60 |
| 15-17 | 5.05 | 2.95 | 2.10 | 1.09 | 4.84 | 2.10 | 3.17 | 41.57 | 3.34 | 2.10 | 3.17 | 41.57 | 3.34 |
| 18-20 | 6.18 | 3.27 | 2.95 | 3.44 | 49.06 | 3.23 | 3.68 | 44.19 | 3.98 | 3.23 | 3.68 | 44.19 | 3.98 |
| 21-23 | 5.78 | 2.55 | 3.23 | 2.71 | 53.77 | 4.20 | 3.60 | 52.86 | 4.00 | 4.20 | 3.60 | 52.86 | 4.00 |
| 00-24 | 5.91 | 2.95 | 2.95 | 3.12 | 54.72 | 3.54 | 3.54 | 51.02 | 3.91 | 3.54 | 3.54 | 51.02 | 3.91 |

10.4A

10.4B

KSC PEAK WINDS HEADWIND TO TAILWIND REVERSALS MONTH OF OCT.

| HRS | KSC PEAK WINDS | | | | HEADWIND TO TAILWIND REVERSALS | | | | MONTH OF OCT. | | | | |
|-------|----------------------|----------------------|----------------------|----------------------|--------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 1.31 | .65 | .42 | 2.37 | 19.05 | 15.87 | 7.14 | 42.06 | 7.14 | 15.87 | 7.14 | 42.06 | 7.14 |
| 03-05 | 1.26 | .72 | .24 | 2.21 | 23.66 | 12.21 | 9.92 | 45.80 | 9.92 | 12.21 | 9.92 | 45.80 | 9.92 |
| 06-08 | 1.25 | 2.20 | .60 | 4.05 | 20.66 | 21.49 | 23.97 | 66.12 | 23.97 | 21.49 | 23.97 | 66.12 | 23.97 |
| 09-11 | .24 | 2.55 | 1.42 | 4.61 | 13.53 | 5.26 | 39.85 | 58.65 | 39.85 | 5.26 | 39.85 | 58.65 | 39.85 |
| 12-14 | .06 | .96 | 1.50 | 2.53 | 8.11 | .90 | 45.95 | 54.95 | 45.95 | .90 | 45.95 | 54.95 | 45.95 |
| 15-17 | .53 | 1.25 | 1.31 | 3.09 | 5.62 | 5.62 | 30.34 | 41.57 | 30.34 | 5.62 | 30.34 | 41.57 | 30.34 |
| 18-20 | 1.27 | 1.45 | .72 | 3.44 | 17.05 | 9.30 | 17.83 | 44.19 | 17.83 | 9.30 | 17.83 | 44.19 | 17.83 |
| 21-23 | 1.45 | .90 | .36 | 2.71 | 20.00 | 18.57 | 14.29 | 52.86 | 14.29 | 18.57 | 14.29 | 52.86 | 14.29 |
| 00-24 | .92 | 1.33 | .87 | 3.12 | 16.53 | 11.53 | 22.96 | 51.02 | 22.96 | 11.53 | 22.96 | 51.02 | 22.96 |

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TABLE 10.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY CLASS | 06-08 | | 12-14 | | 15-17 | | 06-12 | | 09-11 | | 12-14 | | 15-17 | | 06-17 | |
|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|
| | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | |
| 1 | 6.12 | 2.42 | 1.04 | 1.49 | 2.63 | 31.40 | 14.93 | 8.11 | 11.24 | 16.92 | 16.92 | 11.24 | 16.92 | 16.92 | 16.92 | |
| 1-2 | 9.57 | 4.84 | 1.92 | 1.44 | 4.66 | 39.67 | 16.93 | 8.11 | 13.48 | 19.56 | 19.56 | 13.48 | 19.56 | 19.56 | 19.56 | |
| 2-3 | 13.32 | 5.44 | 2.28 | 2.01 | 5.77 | 55.37 | 18.66 | 8.11 | 16.05 | 25.49 | 25.49 | 16.05 | 25.49 | 25.49 | 25.49 | |
| 3-4 | 16.62 | 4.65 | 2.66 | 2.73 | 7.95 | 61.00 | 20.14 | 8.11 | 19.80 | 28.13 | 28.13 | 19.80 | 28.13 | 28.13 | 28.13 | |
| 4-5 | 24.97 | 7.86 | 2.84 | 3.55 | 9.78 | 73.55 | 25.37 | 9.91 | 20.22 | 33.41 | 33.41 | 20.22 | 33.41 | 33.41 | 33.41 | |
| 5-6 | 32.10 | 9.68 | 3.36 | 5.81 | 12.77 | 82.64 | 37.31 | 13.51 | 25.84 | 41.32 | 41.32 | 25.84 | 41.32 | 41.32 | 41.32 | |
| 6-7 | 37.47 | 12.24 | 4.50 | 9.06 | 15.65 | 85.12 | 47.01 | 18.92 | 29.21 | 46.81 | 46.81 | 29.21 | 46.81 | 46.81 | 46.81 | |
| 7-8 | 42.95 | 16.58 | 6.61 | 14.04 | 19.96 | 88.43 | 56.72 | 24.32 | 37.08 | 53.41 | 53.41 | 37.08 | 53.41 | 53.41 | 53.41 | |
| 8-9 | 47.50 | 21.74 | 10.81 | 16.44 | 24.69 | 90.91 | 67.91 | 32.34 | 49.44 | 64.18 | 64.18 | 49.44 | 64.18 | 64.18 | 64.18 | |
| 9-10 | 54.26 | 35.09 | 23.72 | 34.24 | 37.67 | 95.04 | 77.61 | 50.95 | 51.69 | 71.65 | 71.65 | 51.69 | 71.65 | 71.65 | 71.65 | |
| 10-11 | 64.23 | 42.23 | 32.37 | 42.12 | 45.23 | 96.69 | 82.09 | 58.56 | 55.06 | 74.95 | 74.95 | 55.06 | 74.95 | 74.95 | 74.95 | |
| 11-12 | 66.88 | 47.31 | 39.34 | 48.34 | 50.51 | 96.69 | 85.87 | 62.16 | 65.17 | 78.90 | 78.90 | 65.17 | 78.90 | 78.90 | 78.90 | |
| 12-13 | 71.28 | 55.60 | 49.43 | 57.35 | 58.45 | 97.52 | 89.55 | 70.27 | 76.40 | 84.90 | 84.90 | 76.40 | 84.90 | 84.90 | 84.90 | |
| 13-14 | 74.34 | 60.68 | 53.99 | 61.79 | 62.74 | 98.35 | 89.55 | 72.07 | 78.65 | 85.49 | 85.49 | 78.65 | 85.49 | 85.49 | 85.49 | |
| 14-15 | 79.01 | 67.51 | 61.20 | 67.54 | 68.84 | 99.17 | 93.28 | 82.68 | 86.52 | 90.99 | 90.99 | 86.52 | 90.99 | 90.99 | 90.99 | |
| 15-16 | 81.67 | 71.63 | 64.37 | 72.22 | 73.04 | 99.17 | 95.52 | 89.19 | 89.89 | 93.85 | 93.85 | 89.89 | 93.85 | 93.85 | 93.85 | |
| 16-17 | 84.35 | 76.35 | 72.27 | 77.19 | 77.81 | 100.00 | 97.01 | 92.79 | 91.01 | 95.60 | 95.60 | 91.01 | 95.60 | 95.60 | 95.60 | |
| 17-18 | 86.50 | 79.55 | 77.66 | 80.92 | 81.18 | 100.00 | 97.76 | 92.79 | 92.79 | 95.82 | 95.82 | 92.79 | 95.82 | 95.82 | 95.82 | |
| 18-19 | 89.66 | 84.63 | 84.38 | 85.31 | 86.00 | 100.00 | 98.51 | 92.79 | 91.01 | 96.04 | 96.04 | 91.01 | 96.04 | 96.04 | 96.04 | |
| 19-20 | 93.82 | 90.38 | 90.03 | 90.17 | 91.10 | 100.00 | 99.25 | 97.30 | 94.38 | 98.02 | 98.02 | 94.38 | 98.02 | 98.02 | 98.02 | |
| 20-21 | 95.19 | 92.62 | 91.89 | 92.42 | 93.03 | 100.00 | 99.25 | 98.20 | 95.51 | 98.20 | 98.20 | 95.51 | 98.20 | 98.20 | 98.20 | |
| 21-22 | 96.55 | 94.62 | 93.75 | 94.43 | 94.84 | 100.00 | 99.94 | 99.10 | 97.75 | 99.34 | 99.34 | 97.75 | 99.34 | 99.34 | 99.34 | |
| 22-23 | 97.38 | 96.01 | 95.02 | 95.50 | 95.98 | 100.00 | 99.94 | 99.10 | 98.88 | 99.56 | 99.56 | 98.88 | 99.56 | 99.56 | 99.56 | |
| 23-24 | 97.98 | 96.98 | 96.58 | 96.86 | 97.10 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 24-25 | 98.28 | 97.88 | 97.84 | 97.69 | 97.92 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 25-26 | 98.69 | 98.31 | 98.34 | 98.10 | 98.52 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 26-27 | 99.05 | 98.91 | 98.10 | 99.29 | 99.09 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 27-28 | 99.46 | 99.40 | 99.54 | 99.64 | 99.52 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 28-29 | 99.64 | 99.76 | 99.70 | 99.42 | 99.73 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 29-30 | 99.88 | 99.88 | 99.88 | 99.94 | 99.90 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 30-31 | 99.94 | 99.94 | 99.94 | 99.94 | 99.94 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 31-32 | 100.00 | 99.94 | 99.94 | 99.94 | 99.97 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 32-33 | 100.00 | 99.94 | 99.94 | 99.94 | 99.97 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 33-34 | 100.00 | 99.94 | 99.94 | 99.94 | 99.99 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| 34-35 | 100.00 | 99.94 | 99.94 | 99.94 | 100.00 | 100.00 | 99.94 | 99.10 | 99.78 | 100.00 | 100.00 | 99.78 | 99.78 | 99.78 | 99.78 | |
| MCS | 1562 | 1653 | 1665 | 1688 | 6688 | 121 | 134 | 111 | 89 | 855 | 855 | 111 | 89 | 855 | 855 | |

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TABLE 11.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| MRS | MKS PEAK WINDS MONTH OF NOV. | | | | | | | | | | TOTAL NUMBER OBS. |
|-------|------------------------------|--------|----------|----------|----------|----------|----------------|--|--|-------|-------------------|
| | CROSSWINDS | | | | | | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | ZERO CROSSWIND | | | | |
| 00-02 | 50.29 | 33.57 | 5.61 | 2.87 | .88 | .06 | 6.73 | | | 1710 | |
| 03-05 | 51.29 | 33.04 | 5.26 | 3.16 | .64 | .23 | 6.37 | | | 1710 | |
| 06-08 | 47.60 | 36.37 | 5.44 | 2.87 | .88 | .16 | 6.67 | | | 1710 | |
| 09-11 | 27.05 | 51.61 | 10.08 | 4.10 | 1.40 | .41 | 3.74 | | | 1709 | |
| 12-14 | 21.11 | 59.88 | 8.67 | 4.56 | 1.52 | .76 | 3.57 | | | 1710 | |
| 15-17 | 37.00 | 47.04 | 6.20 | 3.33 | .94 | .64 | 3.26 | | | 1710 | |
| 18-20 | 57.08 | 29.18 | 4.33 | 2.22 | .70 | .23 | 6.24 | | | 1710 | |
| 21-23 | 52.11 | 32.40 | 4.80 | 1.58 | .94 | .12 | 8.07 | | | 1710 | |
| 00-23 | 43.15 | 40.49 | 6.39 | 3.09 | .99 | .33 | 5.57 | | | 13679 | |

TABLE 11.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| MRS | MKS PEAK WINDS MONTH OF NOV. | | | | | | | | | | TOTAL NUMBER OBS. |
|-------|------------------------------|--------|----------|----------|----------|----------|--------------------|-------|--------------------|-------|-------------------|
| | TAILWINDS | | | | | | | | | | |
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25 ABOVE | RUNWAY 15 TAILWIND | | RUNWAY 33 TAILWIND | | |
| 00-02 | 3.80 | 2.05 | 1.81 | 1.710 | 1.710 | 1.710 | 23.68 | 33.33 | 30.23 | 30.23 | |
| 03-05 | 4.44 | 2.34 | 1.93 | 1.710 | 1.710 | 1.710 | 26.73 | 31.99 | 26.19 | 26.19 | |
| 06-08 | 4.91 | 2.92 | 1.29 | 1.710 | 1.710 | 1.710 | 26.61 | 30.18 | 29.42 | 29.42 | |
| 09-11 | 1.58 | 5.32 | 2.93 | 1.709 | 1.709 | 1.709 | 9.77 | 25.10 | 51.96 | 51.96 | |
| 12-14 | .41 | 2.63 | 4.56 | 1.710 | 1.710 | 1.710 | 3.74 | 22.34 | 63.39 | 63.39 | |
| 15-17 | .88 | 3.80 | 3.80 | 1.710 | 1.710 | 1.710 | 6.59 | 35.32 | 46.78 | 46.78 | |
| 18-20 | 4.50 | 3.92 | 2.63 | 1.710 | 1.710 | 1.710 | 26.08 | 33.10 | 25.73 | 25.73 | |
| 21-23 | 3.74 | 3.16 | 1.40 | 1.710 | 1.710 | 1.710 | 23.45 | 33.74 | 30.06 | 30.06 | |
| 00-23 | 3.03 | 3.27 | 2.54 | 1.710 | 1.710 | 1.710 | 18.33 | 30.64 | 38.22 | 38.22 | |

TABLE 11.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF NOV. | | NUMBER OBS. 570 | |
|-----------------|--------|-------------------------|----------|---------------|----------|-----------------|------------|
| HOUR 0 | | HOUR 1 | | HOUR 2 | | HOUR 3 | |
| RUNWAY 15 | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| PERCENTAGES | .88 | .35 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 2.81 | 1.40 | 1.40 | 1.58 | .53 | .00 | .00 |
| RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| PERCENTAGES | .00 | .35 | 1.40 | .00 | .00 | .00 | .00 |
| TOTAL | .00 | 1.05 | 1.05 | 26.60 | 2.28 | .00 | .00 |
| RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| PERCENTAGES | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 3.68 | 16.84 | 2.63 | 1.05 | .53 | .35 | .18 |
| RUNWAY 15 | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| PERCENTAGES | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.93 | 1.75 | 1.93 | 1.93 | 1.93 | .35 | .00 |
| RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| PERCENTAGES | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.93 | 1.93 | 46.84 | 33.33 | 4.21 | .88 | .53 |
| RUNWAY 15 | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| PERCENTAGES | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 4.04 | 16.32 | 3.51 | 1.98 | 1.23 | .70 | .00 |
| RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| PERCENTAGES | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.75 | 32.11 | 1.23 | .18 | .35 | .18 | .00 |
| RUNWAY 15 | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| PERCENTAGES | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 2.28 | .53 | 24.91 | 2.98 | .00 | .00 | .00 |
| RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| PERCENTAGES | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 6.07 | 48.95 | 29.65 | 4.74 | 1.58 | .88 | .00 |

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TABLE 11.3. (Continued)

| KSC PEAK WINDS | | | | | | | | | | | | |
|-------------------------|------|------|------|-----|-------|-------|------|------|-----|-----|------|-------|
| MONTH OF NOV. | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | |
| NUMBER OBS. 570 | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
| MONTH OF NOV. | | | | | | | | | | | | |
| TAILWIND LIMITS | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | |
| CROSSWIND LIMITS | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | | |
| 25- UP | | | | | | | | | | | | |
| 25- DOWN | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | |
| 1 TO 4 | 2.28 | 2.28 | .00 | .00 | 17.02 | 3.51 | 1.40 | 1.05 | .35 | .53 | 1.93 | 25.79 |
| 5 TO 9 | .00 | .70 | .00 | .00 | 31.75 | .98 | .53 | .35 | .00 | .00 | .88 | 39.39 |
| 10-14 | .00 | .70 | .00 | .00 | .35 | 23.86 | 2.28 | .18 | .00 | .00 | .00 | 26.67 |
| TOTAL | 2.28 | 2.98 | 1.50 | .18 | 49.12 | 28.25 | 4.21 | 1.50 | .35 | .53 | 2.81 | 86.84 |

| KSC PEAK WINDS | | | | | | | | | | | | |
|-------------------------|------|------|------|-----|-------|-------|------|------|-----|-----|------|-------|
| MONTH OF NOV. | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | |
| NUMBER OBS. 570 | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
| MONTH OF NOV. | | | | | | | | | | | | |
| TAILWIND LIMITS | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | |
| CROSSWIND LIMITS | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | | |
| 25- UP | | | | | | | | | | | | |
| 25- DOWN | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | |
| 1 TO 4 | 1.75 | 1.93 | .00 | .00 | 19.65 | 4.21 | 1.75 | .88 | .70 | .00 | 1.05 | 28.25 |
| 5 TO 9 | .00 | .70 | .00 | .00 | 26.95 | .70 | .35 | .16 | .00 | .00 | .53 | 30.70 |
| 10-14 | .00 | .70 | .00 | .00 | .75 | 26.67 | 1.40 | .00 | .00 | .00 | .00 | 28.77 |
| TOTAL | 1.75 | 2.63 | 1.50 | .18 | 49.38 | 31.58 | 3.51 | 1.05 | .70 | .00 | 1.58 | 87.72 |

| KSC PEAK WINDS | | | | | | | | | | | | |
|-------------------------|------|------|------|-----|-------|-------|------|------|-----|-----|------|-------|
| MONTH OF NOV. | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | |
| NUMBER OBS. 570 | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
| MONTH OF NOV. | | | | | | | | | | | | |
| TAILWIND LIMITS | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | |
| CROSSWIND LIMITS | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | | |
| 25- UP | | | | | | | | | | | | |
| 25- DOWN | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | |
| 1 TO 4 | 2.11 | 2.98 | .00 | .00 | 16.95 | 2.81 | 1.23 | 1.58 | .18 | .18 | 1.23 | 26.19 |
| 5 TO 9 | .00 | .70 | .00 | .00 | 29.87 | .53 | .00 | .18 | .00 | .00 | .35 | 30.88 |
| 10-14 | .00 | .70 | .00 | .00 | .53 | 26.67 | 1.93 | .00 | .00 | .00 | .00 | 29.12 |
| TOTAL | 2.11 | 3.66 | 1.75 | .35 | 49.38 | 30.00 | 3.16 | 1.75 | .18 | .18 | 1.58 | 86.19 |

TABLE 11.3. (Continued)

| WSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF NOV. | | NUMBER OBS. | | 573 | | SUNDAY 33 | | ZERO CROSS | | TOTAL | |
|----------------|------------|-------------------------|------------|---------------|------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE |
| 1 TO 4 | .08 | 1.93 | .00 | 2.91 | 0.00 | 5.61 | 2.63 | 2.81 | 1.93 | 1.05 | .35 | 15.09 | .72 | 15.09 | .72 |
| 5 TO 9 | .00 | 2.28 | .00 | 5.26 | .00 | 26.32 | .88 | .35 | .35 | .00 | .00 | 28.07 | .00 | 28.07 | .00 |
| 10-14 | .00 | .00 | .00 | 1.23 | .00 | .00 | .00 | 39.65 | 3.51 | .00 | .00 | 43.16 | .00 | 43.16 | .00 |
| TOTAL | .08 | 4.21 | 2.03 | 9.19 | 0.00 | 32.81 | 3.51 | 6.67 | 2.28 | 1.05 | .35 | 87.19 | .72 | 87.19 | .72 |

| WSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF NOV. | | NUMBER OBS. | | 570 | | SUNDAY 32 | | ZERO CROSS | | TOTAL | |
|----------------|------------|-------------------------|------------|---------------|------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE |
| 1 TO 4 | .18 | 1.05 | .00 | 1.23 | 0.00 | 3.16 | 1.58 | 1.93 | 1.05 | .70 | .18 | 9.60 | .00 | 9.60 | .00 |
| 5 TO 9 | .00 | 1.23 | .00 | 5.09 | .00 | 21.92 | .70 | .89 | .70 | .18 | .00 | 24.39 | .00 | 24.39 | .00 |
| 10-14 | .00 | .00 | .00 | 3.68 | .00 | 1.27 | 47.37 | 4.56 | .00 | .00 | .00 | 53.51 | .00 | 53.51 | .00 |
| TOTAL | .18 | 2.28 | 0.00 | 10.00 | 0.00 | 26.09 | 49.65 | 7.37 | 1.75 | .88 | .18 | 86.99 | .00 | 86.99 | .00 |

| WSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF NOV. | | NUMBER OBS. | | 549 | | SUNDAY 33 | | ZERO CROSS | | TOTAL | |
|----------------|------------|-------------------------|------------|---------------|------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE | WIND SPEED | PERCENTAGE |
| 1 TO 4 | .35 | .35 | .00 | .70 | 0.00 | 1.27 | .88 | 1.58 | .53 | .98 | .53 | 5.62 | .00 | 5.62 | .00 |
| 5 TO 9 | .00 | 1.76 | .35 | 5.42 | .00 | 22.21 | 1.05 | 1.05 | .35 | .00 | .00 | 22.85 | .00 | 22.85 | .00 |
| 10-14 | .00 | .00 | .00 | 3.87 | .00 | 1.41 | 51.49 | 5.05 | .00 | .00 | .00 | 58.35 | .00 | 58.35 | .00 |
| TOTAL | .35 | 2.11 | 0.35 | 10.19 | 0.00 | 22.85 | 57.43 | 6.09 | .88 | .98 | .53 | 86.82 | .00 | 86.82 | .00 |

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TABLE 11.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF NOV. | | NUMBER OBS. | | 570 | |
|-----------------|---|------------------------------|---|---------------|---|------------------------------|---|---------|---|
| HOUR 15 | | HOUR 15 | | HOUR 15 | | HOUR 15 | | HOUR 15 | |
| TAILWIND LIMITS | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | CROSSWIND LIMITS PERCENTAGES | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | TOTAL | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | CROSSWIND LIMITS PERCENTAGES | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | TOTAL | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP |
| | | | | | | | | | |
| 1 TO 4 | .00 | .35 | .00 | .35 | .18 | .70 | .35 | .18 | 2.46 |
| 5 TO 9 | .00 | 1.23 | .00 | 2.98 | 26.67 | 2.11 | .35 | .00 | 29.65 |
| 10-UP | .00 | .00 | .70 | 3.68 | .53 | 52.81 | .00 | .00 | 58.07 |
| TOTAL | .00 | 1.58 | 2.46 | 7.02 | 27.37 | 54.91 | 5.96 | .70 | 90.18 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF NOV. | | NUMBER OBS. | | 570 | |
|-----------------|---|------------------------------|---|---------------|---|------------------------------|---|---------|---|
| HOUR 16 | | HOUR 16 | | HOUR 16 | | HOUR 16 | | HOUR 16 | |
| TAILWIND LIMITS | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | CROSSWIND LIMITS PERCENTAGES | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | TOTAL | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | CROSSWIND LIMITS PERCENTAGES | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | TOTAL | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP |
| | | | | | | | | | |
| 1 TO 4 | .00 | .70 | .00 | .70 | 1.23 | .53 | .35 | .00 | 2.98 |
| 5 TO 9 | .00 | 1.46 | .00 | 4.21 | 34.21 | 2.46 | .18 | .00 | 37.02 |
| 10-UP | .00 | .00 | .53 | 4.56 | .00 | 44.56 | 2.63 | .35 | 47.54 |
| TOTAL | .00 | 2.11 | 3.53 | 9.47 | 35.44 | 87.54 | 3.33 | .70 | 87.54 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF NOV. | | NUMBER OBS. | | 570 | |
|-----------------|---|------------------------------|---|---------------|---|------------------------------|---|---------|---|
| HOUR 17 | | HOUR 17 | | HOUR 17 | | HOUR 17 | | HOUR 17 | |
| TAILWIND LIMITS | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | CROSSWIND LIMITS PERCENTAGES | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | TOTAL | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | CROSSWIND LIMITS PERCENTAGES | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP | TOTAL | 1 TO 5 TO 9 10T014 15T019 20T024 25- UP |
| | | | | | | | | | |
| 1 TO 4 | .00 | .70 | .00 | 1.58 | 12.28 | .70 | .00 | .35 | 14.21 |
| 5 TO 9 | .00 | 1.75 | .00 | 4.21 | 37.37 | 1.58 | .18 | .00 | 39.30 |
| 10-UP | .00 | .00 | .53 | 3.16 | .35 | 32.63 | 1.23 | .35 | 34.74 |
| TOTAL | .00 | 2.46 | 2.61 | 8.95 | 50.00 | 34.91 | 1.40 | .53 | 88.25 |

TABLE 11.3. (Continued)

MSC PEAK WINDS TAILWINDS VS CROSSWINDS
MONTH OF NOV.

| TAILWIND LIMITS | HOUR 18 | | | | HOUR 19 | | | | HOUR 20 | | | | ZERO CROSS | ZERO CROSS | TOTAL |
|-----------------|---------|--------|----------|----------|---------|--------|----------|----------|---------|--------|----------|----------|------------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | | | |
| 1 TO 4 | 1.75 | 1.40 | .00 | .00 | 3.16 | 2.19 | 1.23 | .18 | 3.16 | 2.19 | 1.23 | .18 | .00 | 2.81 | 26.49 |
| 5 TO 9 | .90 | 1.75 | 1.05 | .18 | 3.96 | 32.99 | 1.23 | .18 | 3.96 | 32.99 | 1.23 | .18 | .00 | .00 | 34.39 |
| 10-UP | .00 | .00 | 1.58 | 1.05 | .53 | .30 | 22.46 | 1.75 | .18 | .00 | .00 | .00 | .00 | .00 | 24.39 |
| TOTAL | 1.75 | 3.16 | 2.63 | 1.93 | 10.53 | 54.91 | 24.91 | 2.11 | 10.53 | 54.91 | 24.91 | 2.11 | .00 | 2.81 | 85.26 |

MSC PEAK WINDS TAILWINDS VS CROSSWINDS
MONTH OF NOV.

| TAILWIND LIMITS | HOUR 18 | | | | HOUR 19 | | | | HOUR 20 | | | | ZERO CROSS | ZERO CROSS | TOTAL |
|-----------------|---------|--------|----------|----------|---------|--------|----------|----------|---------|--------|----------|----------|------------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | | | |
| 1 TO 4 | 3.68 | 1.40 | .00 | .00 | 5.09 | 22.29 | 1.05 | .53 | 5.09 | 22.29 | 1.05 | .53 | .00 | 1.93 | 26.14 |
| 5 TO 9 | .00 | 1.75 | 1.27 | 1.40 | 4.39 | 32.29 | .53 | .00 | 4.39 | 32.29 | .53 | .00 | .00 | .18 | 32.98 |
| 10-UP | .00 | .00 | .68 | .70 | 2.28 | .19 | 24.04 | 1.23 | .00 | .00 | .00 | .00 | .00 | .00 | 25.44 |
| TOTAL | 3.68 | 3.16 | 2.11 | 2.11 | 11.75 | 54.74 | 25.61 | 1.75 | 11.75 | 54.74 | 25.61 | 1.75 | .00 | 2.11 | 84.56 |

MSC PEAK WINDS TAILWINDS VS CROSSWINDS
MONTH OF NOV.

| TAILWIND LIMITS | HOUR 18 | | | | HOUR 19 | | | | HOUR 20 | | | | ZERO CROSS | ZERO CROSS | TOTAL |
|-----------------|---------|--------|----------|----------|---------|--------|----------|----------|---------|--------|----------|----------|------------|------------|-------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | | | |
| 1 TO 4 | 3.68 | 1.58 | .00 | .00 | 5.26 | 21.05 | 2.28 | .70 | 5.26 | 21.05 | 2.28 | .70 | .00 | 1.05 | 25.61 |
| 5 TO 9 | .00 | 1.40 | 1.23 | .60 | 3.72 | 30.00 | .53 | .00 | 3.72 | 30.00 | .53 | .00 | .00 | .53 | 31.93 |
| 10-UP | .00 | .00 | 1.05 | .53 | 2.11 | .53 | 24.91 | 1.40 | .00 | .00 | .00 | .00 | .00 | .18 | 27.37 |
| TOTAL | 3.68 | 2.98 | 2.28 | 1.40 | 10.48 | 52.46 | 27.72 | 2.11 | 10.48 | 52.46 | 27.72 | 2.11 | .00 | 1.75 | 84.91 |

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TABLE 11.3. (Concluded)

| ASC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | ASC PEAK WINDS | | | | | |
|-----------------|------|------------------------------|--------|----------|----------|----------|------------------------------|------------|-------|--------|--------|-----------------|----------|----------|--------|------------|-------|
| MONTH OF NOV. | | MONTH OF NOV. | | | | | | | | | | MONTH OF NOV. | | | | | |
| MOUR 21 | | MOUR 21 | | | | | | | | | | MOUR 23 | | | | | |
| NUMBER OBS. 570 | | NUMBER OBS. 570 | | | | | | | | | | NUMBER OBS. 570 | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | |
| | | CROSSWIND LIMITS PERCENTAGES | | | | | CROSSWIND LIMITS PERCENTAGES | | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 3.33 | .53 | .00 | .00 | .00 | .00 | .00 | .18 | 9.04 | 18.07 | 7.81 | 1.05 | .35 | .35 | .18 | 2.28 | 25.09 |
| 5 TO 9 | .00 | 2.63 | .70 | .70 | .00 | .00 | .00 | .00 | 9.21 | 31.56 | 1.05 | .18 | .18 | .00 | .00 | .70 | 33.68 |
| 10- UP | .00 | .00 | .68 | .70 | .35 | .00 | .00 | .00 | 1.23 | .35 | 26.14 | 1.40 | .00 | .00 | .00 | .00 | 27.89 |
| TOTAL | 3.33 | 3.16 | 1.58 | .70 | .53 | .00 | .18 | 9.07 | 9.07 | 50.00 | 30.00 | 2.63 | .53 | .35 | .18 | 2.98 | 86.67 |
| ASC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | ASC PEAK WINDS | | | | | |
| MONTH OF NOV. | | MONTH OF NOV. | | | | | | | | | | MONTH OF NOV. | | | | | |
| MOUR 22 | | MOUR 22 | | | | | | | | | | MOUR 23 | | | | | |
| NUMBER OBS. 570 | | NUMBER OBS. 570 | | | | | | | | | | NUMBER OBS. 570 | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | |
| | | CROSSWIND LIMITS PERCENTAGES | | | | | CROSSWIND LIMITS PERCENTAGES | | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 3.16 | .70 | .00 | .00 | .00 | .00 | .00 | .00 | 3.86 | 15.79 | 1.75 | 1.05 | .70 | .18 | .18 | 3.33 | 22.98 |
| 5 TO 9 | .00 | 1.40 | 1.23 | .18 | .00 | .00 | .00 | .00 | 2.91 | 30.53 | .88 | .00 | .00 | .00 | .00 | 1.23 | 32.63 |
| 10- UP | .00 | .00 | .70 | .35 | .18 | .00 | .00 | .00 | 1.23 | .88 | 29.30 | 1.58 | .18 | .18 | .00 | .18 | 32.28 |
| TOTAL | 3.16 | 2.11 | 1.93 | .53 | .18 | .00 | .00 | 7.89 | 7.89 | 47.19 | 31.93 | 2.63 | .70 | .35 | .18 | 4.74 | 87.89 |
| ASC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | ASC PEAK WINDS | | | | | |
| MONTH OF NOV. | | MONTH OF NOV. | | | | | | | | | | MONTH OF NOV. | | | | | |
| MOUR 23 | | MOUR 23 | | | | | | | | | | MOUR 23 | | | | | |
| NUMBER OBS. 570 | | NUMBER OBS. 570 | | | | | | | | | | NUMBER OBS. 570 | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | | | | |
| | | CROSSWIND LIMITS PERCENTAGES | | | | | CROSSWIND LIMITS PERCENTAGES | | | | | | | | | | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL |
| 1 TO 4 | 2.28 | 1.05 | .00 | .00 | .00 | .00 | .00 | .00 | 3.73 | 15.26 | 1.58 | 1.2 | .88 | .88 | .00 | 2.46 | 22.28 |
| 5 TO 9 | .00 | .53 | 1.23 | .70 | .00 | .00 | .00 | .00 | 2.46 | 33.51 | .35 | .35 | .00 | .18 | .00 | .53 | 34.91 |
| 10- UP | .00 | .00 | .88 | .53 | .35 | .00 | .00 | .00 | 1.75 | 1.58 | 26.89 | 1.93 | .00 | .00 | .00 | .00 | 30.00 |
| TOTAL | 2.28 | 1.58 | 2.11 | 1.23 | .35 | .00 | .00 | 7.54 | 7.54 | 50.35 | 28.82 | 3.51 | .88 | 1.05 | .00 | 2.98 | 87.19 |

TABLE 11.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| MPS | KSC PEAK WINDS | | | | KSC PEAK WINDS | | | | | |
|-------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-------|------|
| | MONTH OF NOV. | | MONTH OF NOV. | | MONTH OF NOV. | | MONTH OF NOV. | | | |
| | 15 | 15 | 33 | 33 | 15 | 15 | 33 | 33 | | |
| | GIVEN A HEADWIND | | GIVEN A HEADWIND | | GIVEN A HEADWIND | | GIVEN A HEADWIND | | | |
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | | |
| | TAIL-TO-HEAD | TAIL-TO-HEAD | TAIL-TO-HEAD | TAIL-TO-HEAD | TAIL-TO-HEAD | TAIL-TO-HEAD | TAIL-TO-HEAD | TAIL-TO-HEAD | | |
| 00-02 | 5.96 | 3.10 | 2.75 | 3.36 | 35.88 | 7.73 | 3.81 | 3.93 | 29.82 | 9.50 |
| 03-06 | 7.60 | 3.24 | 3.16 | 4.11 | 42.95 | 9.29 | 4.63 | 4.57 | 35.27 | 5.26 |
| 06-09 | 10.31 | 5.27 | 5.04 | 5.80 | 55.13 | 12.15 | 6.09 | 6.03 | 44.07 | 7.00 |
| 09-11 | 11.60 | 5.39 | 6.21 | 5.98 | 63.10 | 11.66 | 6.33 | 5.33 | 48.00 | 6.14 |
| 12-14 | 8.03 | 4.04 | 3.98 | 4.38 | 52.31 | 9.08 | 4.04 | 4.04 | 38.33 | 4.52 |
| 15-17 | 7.73 | 4.95 | 3.28 | 4.87 | 38.62 | 9.32 | 3.34 | 4.98 | 29.38 | 5.62 |
| 18-20 | 9.14 | 4.39 | 4.75 | 4.94 | 42.86 | 10.46 | 5.57 | 5.10 | 36.82 | 6.00 |
| 21-23 | 7.89 | 3.22 | 3.87 | 3.51 | 46.98 | 9.98 | 5.04 | 4.86 | 39.45 | 5.57 |
| 20-23 | 8.41 | 4.20 | 4.20 | 4.61 | 47.44 | 9.71 | 4.86 | 4.86 | 37.82 | 5.57 |

KSC PEAK WINDS - HEADWIND TO TAILWIND REVERSALS MONTH OF NOV.

| MPS | GIVEN A HEADWIND | | GIVEN A HEADWIND | | GIVEN A HEADWIND | | GIVEN A HEADWIND | |
|-------|------------------------------|-------|------------------------------|-------|------------------------------|-------|------------------------------|-------|
| | 20 - 3 | 4 - 8 | 20 - 3 | 4 - 8 | 20 - 3 | 4 - 8 | 20 - 3 | 4 - 8 |
| | RESULTANT TAILWIND MAGNITUDE | | RESULTANT TAILWIND MAGNITUDE | | RESULTANT TAILWIND MAGNITUDE | | RESULTANT TAILWIND MAGNITUDE | |
| | TOTAL | TOTAL | TOTAL | TOTAL | TOTAL | TOTAL | TOTAL | TOTAL |
| 00-02 | 1.71 | 1.27 | .38 | 3.36 | 16.97 | 7.80 | 5.05 | 29.82 |
| 03-06 | 2.31 | .96 | .43 | 4.11 | 18.30 | 7.59 | 9.38 | 35.27 |
| 06-09 | 2.39 | 2.04 | .77 | 5.80 | 19.07 | 12.44 | 13.56 | 44.07 |
| 09-11 | .39 | 2.47 | 3.12 | 5.98 | 9.78 | 4.44 | 33.74 | 48.00 |
| 12-14 | .25 | 1.65 | 2.47 | 4.38 | 6.67 | .56 | 31.11 | 38.33 |
| 15-17 | 1.09 | 2.18 | 1.60 | 4.87 | 4.64 | 6.70 | 18.04 | 29.38 |
| 18-20 | 2.50 | 1.45 | .99 | 4.94 | 15.12 | 10.85 | 10.85 | 36.22 |
| 21-23 | 1.47 | 1.09 | .96 | 3.51 | 20.64 | 9.17 | 9.63 | 39.45 |
| 20-23 | 1.91 | 1.71 | 1.34 | 4.61 | 14.26 | 7.59 | 15.97 | 37.82 |

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TABLE 11.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY COMPONENT CLASS | 06-08 | | 09-11 | | 12-14 | | 15-17 | | 18-20 | | 21-23 | | 24-26 | | 27-29 | | 30-32 | | 33-35 | | 36-38 | | 39-41 | | 42-44 | | 45-47 | | 48-50 | | | | |
|------------------------------|--------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | HOURS | CPF | | | |
| 1-1 | 12.10 | 5.39 | 3.35 | 3.45 | 6.06 | 34.32 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | 25.33 | 27.78 | | | |
| 1-2 | 16.92 | 9.28 | 5.34 | 6.54 | 9.01 | 39.91 | 75.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | 27.78 | | | |
| 2-3 | 20.79 | 10.71 | 5.89 | 6.01 | 10.82 | 53.81 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | 28.44 | 29.44 | | | |
| 3-4 | 24.66 | 12.64 | 6.46 | 6.05 | 13.44 | 63.14 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | 30.00 | 32.44 | | |
| 4-5 | 28.53 | 14.54 | 7.22 | 10.29 | 16.57 | 69.49 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | 31.67 | 37.33 | | |
| 5-6 | 32.40 | 16.46 | 8.06 | 15.97 | 24.45 | 76.27 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | 33.33 | 42.22 | | |
| 6-7 | 36.27 | 18.37 | 10.70 | 21.29 | 25.61 | 79.66 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | 37.22 | 53.78 | | |
| 7-8 | 40.14 | 20.29 | 13.92 | 27.58 | 30.56 | 84.75 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | 60.00 | 61.67 | |
| 8-9 | 44.01 | 22.21 | 17.10 | 34.57 | 35.32 | 87.29 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 | 50.00 | 66.67 |
| 9-10 | 47.88 | 24.14 | 20.29 | 41.69 | 40.89 | 90.89 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 | 56.67 | 77.78 |
| 10-11 | 51.75 | 26.06 | 23.47 | 48.69 | 45.78 | 94.78 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 | 63.89 | 81.78 |
| 11-12 | 55.62 | 27.99 | 26.65 | 55.68 | 50.67 | 98.67 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 | 74.22 | 86.67 |
| 12-13 | 59.49 | 29.92 | 29.84 | 62.55 | 55.56 | 102.55 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 | 81.56 | 91.56 |
| 13-14 | 63.36 | 31.84 | 32.72 | 69.42 | 60.45 | 106.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 | 86.42 | 96.42 |
| 14-15 | 67.23 | 33.77 | 35.59 | 76.29 | 65.38 | 110.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 | 91.29 | 101.29 |
| 15-16 | 71.10 | 35.70 | 38.46 | 83.14 | 70.31 | 114.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 | 96.14 | 106.14 |
| 16-17 | 74.97 | 37.62 | 41.32 | 90.00 | 75.24 | 118.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 | 101.00 | 111.00 |
| 17-18 | 78.84 | 39.54 | 44.19 | 96.86 | 80.17 | 121.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 | 106.86 | 116.86 |
| 18-19 | 82.71 | 41.46 | 47.06 | 103.72 | 85.02 | 125.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 | 111.72 | 121.72 |
| 19-20 | 86.58 | 43.38 | 49.93 | 110.58 | 89.87 | 129.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 | 116.58 | 126.58 |
| 20-21 | 90.45 | 45.30 | 52.80 | 117.44 | 94.78 | 133.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 | 121.44 | 131.44 |
| 21-22 | 94.32 | 47.22 | 55.67 | 124.30 | 99.70 | 137.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 | 127.30 | 137.30 |
| 22-23 | 98.19 | 49.14 | 58.54 | 131.16 | 104.62 | 141.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 | 131.16 | 141.16 |
| 23-24 | 102.06 | 51.06 | 61.41 | 138.02 | 109.50 | 145.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 | 135.02 | 145.02 |
| 24-25 | 105.93 | 52.99 | 64.28 | 144.88 | 114.84 | 148.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 | 138.84 | 148.84 |
| 25-26 | 109.80 | 54.91 | 67.15 | 151.74 | 119.70 | 152.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 | 142.74 | 152.74 |
| 26-27 | 113.67 | 56.84 | 70.02 | 158.60 | 124.56 | 156.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 | 146.60 | 156.60 |
| 27-28 | 117.54 | 58.76 | 72.89 | 165.46 | 129.38 | 160.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 | 150.46 | 160.46 |
| 28-29 | 121.41 | 60.69 | 75.76 | 172.32 | 134.20 | 164.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 | 154.32 | 164.32 |
| 29-30 | 125.28 | 62.61 | 78.63 | 179.18 | 139.02 | 168.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 | 158.18 | 168.18 |
| 30-31 | 129.15 | 64.54 | 81.50 | 186.04 | 143.84 | 172.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 | 162.04 | 172.04 |
| 31-32 | 133.02 | 66.46 | 84.37 | 192.90 | 148.66 | 175.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 | 166.90 | 175.90 |
| 32-33 | 136.89 | 68.39 | 87.24 | 199.76 | 153.48 | 179.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 | 170.76 | 179.76 |
| 33-34 | 140.76 | 70.31 | 90.11 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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DECEMBER

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TABLE 12.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| RUNWAY | MSC PEAK WINDS MONTH OF DEC. | | | | | TOTAL NUMBER OBS. | |
|--------|--|--------|----------|----------|----------|-------------------|-------------------|
| | CROSSWINDS | | | | | | |
| HRS | CROSSWIND CRITICAL LIMITS IN KNOTS PERCENTAGES | | | | | ZERO CROSSWIND | TOTAL NUMBER OBS. |
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | |
| 0-02 | 49.43 | 34.92 | 5.44 | 2.32 | .68 | .28 | 1764 |
| 03-05 | 50.57 | 32.77 | 7.09 | 1.93 | .85 | .17 | 1764 |
| 6-08 | 47.85 | 36.85 | 6.80 | 1.92 | .85 | .29 | 1764 |
| 10-11 | 26.87 | 52.49 | 12.59 | 4.31 | .96 | .28 | 1764 |
| 12-14 | 19.73 | 57.37 | 13.15 | 5.84 | 1.25 | .23 | 1764 |
| 15-17 | 34.43 | 50.40 | 10.15 | 2.89 | .85 | .11 | 1764 |
| 18-20 | 50.23 | 36.79 | 6.35 | 1.32 | .23 | .11 | 1764 |
| 21-23 | 51.53 | 34.18 | 5.44 | 1.36 | .23 | .28 | 1764 |
| 00-27 | 41.29 | 41.97 | 9.38 | 2.70 | .74 | .22 | 14112 |

TABLE 12.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| HRS | MSC PEAK WINDS MONTH OF DEC. | | | | | TOTAL NUMBER OBS. | |
|--------|--|--------|----------|----------|----------|-------------------|-------------------|
| | TAILWINDS | | | | | | |
| RUNWAY | CROSSWIND CRITICAL LIMITS IN KNOTS PERCENTAGES | | | | | ZERO CROSSWIND | TOTAL NUMBER OBS. |
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | |
| 00-02 | 3.34 | 2.38 | 1.25 | 1.25 | 1.25 | 1764 | 32.37 |
| 03-05 | 4.20 | 1.76 | 1.36 | 1.36 | 1.36 | 1764 | 29.48 |
| 06-08 | 5.39 | 2.38 | 1.08 | 1.08 | 1.08 | 1764 | 26.42 |
| 09-11 | 2.44 | 4.54 | 3.00 | 3.00 | 3.00 | 1764 | 22.56 |
| 12-14 | .74 | 5.73 | 4.77 | 4.77 | 4.77 | 1764 | 20.01 |
| 15-17 | 1.30 | 5.16 | 4.02 | 4.02 | 4.02 | 1764 | 30.95 |
| 18-20 | 5.84 | 3.63 | 1.42 | 1.42 | 1.42 | 1764 | 30.50 |
| 21-23 | 3.46 | 1.93 | .96 | .96 | .96 | 1764 | 33.79 |
| 00-27 | 3.34 | 3.44 | 2.18 | 2.18 | 2.18 | 14112 | 29.36 |

TABLE 12.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| HSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | HSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | HSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | |
|---|------|---|------|-----|-----|-----|-----|-----|-----|-----|------|---|-------|---|------|------|-----|------|-------|-------|--|--|--|---|--|---|--|--|--|--|--|--|--|--|--|--------|--|
| MONTH OF DEC. | | MONTH OF DEC. | | | | | | | | | | MONTH OF DEC. | | MONTH OF DEC. | | | | | | | | | | MONTH OF DEC. | | MONTH OF DEC. | | | | | | | | | | | |
| HOUR 0 | | HOUR 1 | | | | | | | | | | HOUR 2 | | HOUR 1 | | | | | | | | | | HOUR 2 | | HOUR 1 | | | | | | | | | | HOUR 2 | |
| NUMBER OBS. 500 | | NUMBER OBS. 500 | | | | | | | | | | NUMBER OBS. 500 | | NUMBER OBS. 500 | | | | | | | | | | NUMBER OBS. 500 | | NUMBER OBS. 500 | | | | | | | | | | | |
| RUNWAY 15 | | RUNWAY 15 | | | | | | | | | | RUNWAY 15 | | RUNWAY 15 | | | | | | | | | | RUNWAY 15 | | RUNWAY 15 | | | | | | | | | | | |
| CROSSWIND LIMITS | | CROSSWIND LIMITS | | | | | | | | | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | | | | | | | | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | | | | | | | | | | |
| 1 TO 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | 1 TO 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | 1 TO 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | 1 TO 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | 1 TO 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | 1 TO 5 TO 9 10 TO 14 15 TO 19 20 TO 24 25- UP | | | | | | | | | | | |
| PERCENTAGES | | PERCENTAGES | | | | | | | | | | PERCENTAGES | | PERCENTAGES | | | | | | | | | | PERCENTAGES | | PERCENTAGES | | | | | | | | | | | |
| 1 TO 4 | | 1 TO 4 | | | | | | | | | | 1 TO 4 | | 1 TO 4 | | | | | | | | | | 1 TO 4 | | 1 TO 4 | | | | | | | | | | | |
| 5 TO 9 | | 5 TO 9 | | | | | | | | | | 5 TO 9 | | 5 TO 9 | | | | | | | | | | 5 TO 9 | | 5 TO 9 | | | | | | | | | | | |
| 10- UP | | 10- UP | | | | | | | | | | 10- UP | | 10- UP | | | | | | | | | | 10- UP | | 10- UP | | | | | | | | | | | |
| TOTAL | | TOTAL | | | | | | | | | | TOTAL | | TOTAL | | | | | | | | | | TOTAL | | TOTAL | | | | | | | | | | | |
| 1 TO 4 | 2.04 | .51 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.55 | 14.46 | 3.74 | .85 | 1.02 | .51 | .17 | 1.53 | 22.28 | | | | | | | | | | | | | | | | | |
| 5 TO 9 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 3.21 | 33.59 | .68 | .00 | .00 | .00 | .00 | 1.36 | 35.54 | | | | | | | | | | | | | | | | | |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.36 | 1.19 | 27.21 | 3.23 | .17 | .00 | .00 | .00 | 31.00 | | | | | | | | | | | | | | | | | |
| TOTAL | 2.04 | 1.07 | 1.36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 6.12 | 49.15 | 31.63 | 4.08 | 1.19 | .51 | .17 | 2.89 | 89.63 | | | | | | | | | | | | | | | | | | |

TABLE 12.3. (Continued)

| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | MONTH OF DEC. | | |
|-----------------------------|--------|-----------------------------|--------|----------|----------|----------|-----------------------------|--------|----------|----------|----------|-----------------------------|-------|-------|
| MOUR 6 | | NUMBER OBS. 588 | | | | | NUMBER OBS. 588 | | | | | NUMBER OBS. 588 | | |
| TAILWIND LIMITS | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | | ZERO CROSS | TOTAL | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | |
| CROSSING LIMITS PERCENTAGES | | CROSSING LIMITS PERCENTAGES | | | | | CROSSING LIMITS PERCENTAGES | | | | | CROSSING LIMITS PERCENTAGES | | |
| 1 TO 4 | 2.72 | 2.40 | .00 | .00 | .00 | 6.12 | 17.86 | 5.61 | 2.38 | 1.02 | .51 | .17 | 1.36 | 28.91 |
| 5 TO 9 | .00 | 1.36 | .34 | .60 | .00 | 2.38 | 25.89 | .68 | .34 | .17 | .00 | .00 | 1.36 | 28.23 |
| 10-14 | .00 | .00 | .17 | .34 | .00 | .68 | 1.36 | 26.36 | 2.72 | .00 | .00 | .00 | .17 | 30.61 |
| TOTAL | 2.72 | 3.76 | .51 | 1.02 | .17 | 9.18 | 44.97 | 32.65 | 5.04 | 1.19 | .51 | .17 | 2.89 | 87.76 |
| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | MONTH OF DEC. | | |
| MOUR 7 | | NUMBER OBS. 588 | | | | | NUMBER OBS. 588 | | | | | NUMBER OBS. 588 | | |
| TAILWIND LIMITS | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | | ZERO CROSS | TOTAL | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | |
| CROSSING LIMITS PERCENTAGES | | CROSSING LIMITS PERCENTAGES | | | | | CROSSING LIMITS PERCENTAGES | | | | | CROSSING LIMITS PERCENTAGES | | |
| 1 TO 4 | 3.23 | 2.55 | .00 | .00 | .00 | 5.78 | 17.35 | 4.25 | 1.70 | 1.02 | .17 | .00 | .05 | 26.36 |
| 5 TO 9 | .00 | .85 | .68 | .17 | .00 | 1.70 | 26.74 | .51 | .17 | .00 | .00 | .00 | 1.36 | 30.95 |
| 10-14 | .00 | .00 | .51 | .17 | .00 | 1.19 | 1.02 | 27.21 | 2.72 | .00 | .00 | .00 | .00 | 30.95 |
| TOTAL | 3.23 | 3.40 | 1.19 | .68 | .17 | 8.67 | 47.11 | 31.97 | 4.59 | 1.19 | 1.02 | .17 | 2.21 | 88.27 |
| MSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | MONTH OF DEC. | | |
| MOUR 8 | | NUMBER OBS. 588 | | | | | NUMBER OBS. 588 | | | | | NUMBER OBS. 588 | | |
| TAILWIND LIMITS | 1 TO 4 | DUNWAY 15 | | | | | DUNWAY 33 | | | | | ZERO CROSS | TOTAL | |
| | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | |
| CROSSING LIMITS PERCENTAGES | | CROSSING LIMITS PERCENTAGES | | | | | CROSSING LIMITS PERCENTAGES | | | | | CROSSING LIMITS PERCENTAGES | | |
| 1 TO 4 | 2.21 | 2.04 | .00 | .00 | .00 | 4.25 | 14.97 | 3.57 | 2.72 | 1.02 | .14 | .17 | 1.19 | 23.98 |
| 5 TO 9 | .00 | 1.36 | .34 | .60 | .00 | 3.04 | 24.53 | .68 | .34 | .17 | .00 | .00 | .05 | 28.74 |
| 10-14 | .00 | .00 | .17 | .34 | .00 | 1.36 | 1.87 | 29.93 | 3.74 | .00 | .00 | .00 | .17 | 35.71 |
| TOTAL | 2.21 | 3.40 | 1.87 | .51 | .14 | 8.67 | 43.37 | 34.35 | 6.80 | 1.19 | .34 | .17 | 2.21 | 88.44 |

TABLE 12.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF DEC. | | NUMBER OBS. 500 | | | | | | | |
|----------------------------------|------|----------------------------------|------|----------------------------------|------|----------------------------------|-------|-------|------|------|------|-----|-------|
| HOUR 9 | | HOUR 9 | | HOUR 9 | | HOUR 9 | | | | | | | |
| RUNWAY 15 | | RUNWAY 15 | | RUNWAY 33 | | RUNWAY 33 | | | | | | | |
| CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | CROSSWIND LIMITS | | | | | | | |
| 1 TO 5 TO 9 10T019 20T024 25- UP | | 1 TO 5 TO 9 10T019 20T024 25- UP | | 1 TO 5 TO 9 10T019 20T024 25- UP | | 1 TO 5 TO 9 10T019 20T024 25- UP | | | | | | | |
| PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | PERCENTAGES | | | | | | | |
| ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | ZERO CROSS | | | | | | | |
| TOTAL | | TOTAL | | TOTAL | | TOTAL | | | | | | | |
| 1 TO 4 | 1.53 | 2.72 | .00 | .00 | 4.42 | 6.46 | 3.06 | 3.57 | 2.04 | .17 | .34 | .34 | 15.99 |
| 5 TO 9 | .00 | 1.02 | 1.70 | .34 | .00 | 3.06 | 24.49 | 1.02 | .51 | .68 | .00 | .00 | 27.21 |
| 10-UP | .00 | .00 | .00 | .34 | .00 | 1.87 | 2.89 | 38.27 | 4.25 | .51 | .00 | .00 | 45.92 |
| TOTAL | 1.53 | 3.74 | 2.72 | .68 | .34 | 9.35 | 33.84 | 42.35 | 8.33 | 3.23 | .17 | .34 | 89.12 |
| KSC PEAK WINDS | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF DEC. | | | | | | | | | | | | | |
| NUMBER OBS. 500 | | | | | | | | | | | | | |
| HOUR 9 | | | | | | | | | | | | | |
| RUNWAY 15 | | | | | | | | | | | | | |
| CROSSWIND LIMITS | | | | | | | | | | | | | |
| 1 TO 5 TO 9 10T019 20T024 25- UP | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | | |
| 1 TO 4 | .68 | 1.53 | .00 | .00 | 2.21 | 2.04 | 2.38 | 2.89 | 7.04 | 1.36 | .17 | .17 | 11.05 |
| 5 TO 9 | .00 | 1.19 | 2.72 | 1.02 | .00 | 4.93 | 20.24 | .68 | .51 | .17 | .00 | .00 | 22.45 |
| 10-UP | .00 | .00 | .00 | .34 | .00 | 2.55 | 2.55 | 47.11 | 5.44 | .00 | .00 | .00 | 55.27 |
| TOTAL | .68 | 2.72 | 4.25 | 1.70 | .34 | 9.69 | 24.83 | 50.17 | 8.04 | 2.21 | 1.36 | .17 | 88.78 |
| KSC PEAK WINDS | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF DEC. | | | | | | | | | | | | | |
| NUMBER OBS. 500 | | | | | | | | | | | | | |
| HOUR 11 | | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | | |
| CROSSWIND LIMITS | | | | | | | | | | | | | |
| 1 TO 5 TO 9 10T019 20T024 25- UP | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | |
| ZERO CROSS | | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | | |
| 1 TO 4 | .00 | .68 | .00 | .00 | .68 | 1.02 | 1.53 | 1.87 | 1.70 | .34 | .00 | .00 | 6.46 |
| 5 TO 9 | .00 | 1.53 | 2.38 | 1.70 | .00 | 5.61 | 16.57 | .51 | .51 | .17 | .00 | .00 | 18.03 |
| 10-UP | .00 | .00 | .00 | .34 | .00 | 4.59 | 54.25 | 6.12 | .17 | .00 | .00 | .00 | 63.10 |
| TOTAL | .00 | 2.21 | 5.10 | 2.89 | .34 | 10.68 | 19.73 | 8.50 | 2.04 | .34 | .00 | .00 | 87.59 |

TABLE 12.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
|-----------------|--------|-------------------------|----------|-------------|----------|--------|-----------------|-------|-----------|-------------|----------|----------|----------|-------|--------|
| MONTH OF DEC. | | MONTH OF DEC. | | | | | | | | | | | | | |
| HOUR 12 | | NUMBER OBS. 588 | | | | | NUMBER OBS. 588 | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | PUNWAY 33 | | | | | TOTAL | |
| | | | | | | | | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | 25- UP |
| | | CROSSWIND LIMITS | | PERCENTAGES | | | | | | PERCENTAGES | | | | | |
| 1 TO 4 | .00 | .85 | .00 | .00 | .07 | .00 | .00 | .85 | .38 | 1.19 | 1.67 | 1.53 | .51 | .00 | 5.00 |
| 5 TO 9 | .00 | 1.19 | 2.36 | 3.00 | .12 | .00 | .00 | 6.00 | 15.00 | 1.36 | .51 | .34 | .00 | .00 | 10.20 |
| 10- UP | .00 | .00 | 2.55 | .68 | .68 | .17 | .00 | 4.08 | 3.06 | 52.09 | 6.29 | .68 | .00 | .17 | 63.10 |
| TOTAL | .00 | 2.04 | 4.93 | 3.74 | .85 | .17 | .00 | 11.73 | 18.00 | 55.44 | 6.67 | 2.55 | .51 | .17 | 86.73 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF DEC. | | MONTH OF DEC. | | | | | | | | | | | | | |
| HOUR 13 | | NUMBER OBS. 508 | | | | | NUMBER OBS. 508 | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | PUNWAY 33 | | | | | TOTAL | |
| | | | | | | | | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | 25- UP |
| | | CROSSWIND LIMITS | | PERCENTAGES | | | | | | PERCENTAGES | | | | | |
| 1 TO 4 | .00 | .51 | .00 | .00 | .00 | .00 | .00 | .51 | .68 | .85 | 2.21 | 1.36 | .51 | .00 | 5.61 |
| 5 TO 9 | .00 | 1.87 | 1.19 | 1.70 | .34 | .00 | .00 | 5.10 | 15.99 | .85 | .60 | .51 | .00 | .00 | 18.71 |
| 10- UP | .00 | .00 | 3.23 | 1.19 | .68 | .00 | .00 | 5.10 | 1.70 | 54.42 | 6.46 | .34 | .17 | .17 | 63.61 |
| TOTAL | .00 | 2.38 | 4.42 | 2.89 | 1.02 | .00 | .00 | 10.71 | 18.37 | 56.12 | 9.35 | 2.21 | .68 | .17 | 87.93 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF DEC. | | MONTH OF DEC. | | | | | | | | | | | | | |
| HOUR 14 | | NUMBER OBS. 508 | | | | | NUMBER OBS. 508 | | | | | | | | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | TOTAL | PUNWAY 33 | | | | | TOTAL | |
| | | | | | | | | | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | 25- UP |
| | | CROSSWIND LIMITS | | PERCENTAGES | | | | | | PERCENTAGES | | | | | |
| 1 TO 4 | .17 | .68 | .00 | .00 | .00 | .00 | .00 | .85 | .68 | .51 | .85 | 1.19 | .51 | .17 | 4.08 |
| 5 TO 9 | .90 | 1.02 | 1.70 | 2.55 | .00 | .00 | .00 | 5.27 | 19.39 | 2.04 | .68 | .51 | .00 | .00 | 23.33 |
| 10- UP | .00 | .00 | 2.21 | 1.53 | .17 | .00 | .00 | 3.91 | 1.70 | 51.87 | 6.63 | .34 | .00 | .00 | 61.22 |
| TOTAL | .17 | 1.70 | 3.91 | 4.08 | .17 | .00 | .00 | 10.03 | 21.77 | 54.42 | 8.16 | 2.04 | .51 | .17 | 88.00 |

TABLE 12.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF DEC. | | NUMBER OBS. | | 588 | |
|-----------------|--------|--------------------------|--------|---------------|-----------|-------------|----------|------------|-------|
| HOUR 15 | | HOUR 15 | | HOUR 15 | | HOUR 15 | | HOUR 15 | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | RUNWAY 33 | | | ZERO CROSS | TOTAL |
| | | *** CROSSWIND LIMITS *** | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | |
| 1 TO 4 | .00 | .68 | .00 | .68 | 1.19 | .51 | .17 | .00 | 3.06 |
| 5 TO 9 | .00 | .68 | .00 | 4.93 | 22.62 | 1.70 | .00 | .00 | 24.66 |
| 10- UP | .00 | 3.23 | 1.36 | 5.44 | .68 | 53.57 | .00 | .34 | 60.03 |
| TOTAL | .00 | 1.36 | 5.95 | 2.72 | .85 | 23.98 | 5.95 | .34 | 87.76 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF DEC. | | NUMBER OBS. | | 588 | |
|-----------------|--------|--------------------------|--------|---------------|-----------|-------------|----------|------------|-------|
| HOUR 16 | | HOUR 16 | | HOUR 16 | | HOUR 16 | | HOUR 16 | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | RUNWAY 33 | | | ZERO CROSS | TOTAL |
| | | *** CROSSWIND LIMITS *** | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | |
| 1 TO 4 | .17 | 1.02 | .00 | 1.19 | 1.70 | .51 | .17 | .00 | 3.91 |
| 5 TO 9 | .00 | 2.36 | 1.02 | 4.93 | 29.25 | 2.69 | .00 | .00 | 33.16 |
| 10- UP | .00 | 3.40 | .51 | 4.75 | 1.02 | 45.24 | .00 | .00 | 51.36 |
| TOTAL | .17 | 3.40 | 1.97 | 1.97 | 31.97 | 48.64 | 6.00 | .17 | 88.44 |

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF DEC. | | NUMBER OBS. | | 588 | |
|-----------------|--------|--------------------------|--------|---------------|-----------|-------------|----------|------------|-------|
| HOUR 17 | | HOUR 17 | | HOUR 17 | | HOUR 17 | | HOUR 17 | |
| TAILWIND LIMITS | 1 TO 4 | RUNWAY 15 | | | RUNWAY 33 | | | ZERO CROSS | TOTAL |
| | | *** CROSSWIND LIMITS *** | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | |
| 1 TO 4 | .85 | 1.19 | .00 | 2.04 | 12.41 | 1.87 | .85 | .00 | 16.50 |
| 5 TO 9 | .00 | 2.36 | 2.36 | 5.61 | 32.65 | 2.04 | .00 | .00 | 35.03 |
| 10- UP | .00 | .00 | 1.36 | 2.36 | .34 | 33.84 | 2.72 | .00 | 36.90 |
| TOTAL | .85 | 3.57 | 3.74 | 1.36 | 45.41 | 37.76 | 3.57 | .17 | 88.44 |

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TABLE 12.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF DEC. | | NUMBER OBS. 598 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|------------|----------------|--|-------------------------|--|--|-----------|-----------|--|-----------------|--------------------------|--------------------------|--|--------|--|--|--|--------|-----------------------|--------------------------|--|--------|-----------------------|-------------------------|--|-------|------------------------|----------------------------|--|--|--|------------|------------|--|--|---------------------|------------|--|--|---------------------|-----------|--|--|---------------------|-----------|--|--|---------------------|------------|
| HOUR 18 | | HOUR 19 | | HOUR 20 | | HOUR 21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MONTH OF DEC. | | MONTH OF DEC. | | MONTH OF DEC. | | MONTH OF DEC. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="0" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:25%;"></td> <td style="width:25%; text-align: center;">RUNWAY 15</td> <td style="width:25%; text-align: center;">RUNWAY 33</td> <td style="width:25%;"></td> </tr> <tr> <td>TAILWIND LIMITS</td> <td>*** CROSSWIND LIMITS ***</td> <td>*** CROSSWIND LIMITS ***</td> <td></td> </tr> <tr> <td>1 TO 4</td> <td>1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES</td> <td>1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES</td> <td></td> </tr> <tr> <td>5 TO 9</td> <td>2.72 1.70 .00 .00 .00</td> <td>4.42 20.41 3.06 1.02 .17</td> <td></td> </tr> <tr> <td>10- UP</td> <td>.00 3.23 .05 .34 .00</td> <td>4.42 29.04 1.02 .17 .00</td> <td></td> </tr> <tr> <td>TOTAL</td> <td>.72 4.93 1.07 .05 .34</td> <td>10.71 47.45 32.48 4.25 .17</td> <td></td> </tr> <tr> <td></td> <td></td> <td>ZERO CROSS</td> <td>ZERO TOTAL</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>.68 25.34</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>.68 28.91</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>.00 31.96</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>1.36 85.71</td> </tr> </table> | | | | | | | | | RUNWAY 15 | RUNWAY 33 | | TAILWIND LIMITS | *** CROSSWIND LIMITS *** | *** CROSSWIND LIMITS *** | | 1 TO 4 | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | | 5 TO 9 | 2.72 1.70 .00 .00 .00 | 4.42 20.41 3.06 1.02 .17 | | 10- UP | .00 3.23 .05 .34 .00 | 4.42 29.04 1.02 .17 .00 | | TOTAL | .72 4.93 1.07 .05 .34 | 10.71 47.45 32.48 4.25 .17 | | | | ZERO CROSS | ZERO TOTAL | | | .00 .00 .00 .00 .00 | .68 25.34 | | | .00 .00 .00 .00 .00 | .68 28.91 | | | .00 .00 .00 .00 .00 | .00 31.96 | | | .00 .00 .00 .00 .00 | 1.36 85.71 |
| | RUNWAY 15 | RUNWAY 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWIND LIMITS | *** CROSSWIND LIMITS *** | *** CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 TO 4 | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 TO 9 | 2.72 1.70 .00 .00 .00 | 4.42 20.41 3.06 1.02 .17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10- UP | .00 3.23 .05 .34 .00 | 4.42 29.04 1.02 .17 .00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL | .72 4.93 1.07 .05 .34 | 10.71 47.45 32.48 4.25 .17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ZERO CROSS | ZERO TOTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | .68 25.34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | .68 28.91 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | .00 31.96 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | 1.36 85.71 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="0" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:25%;"></td> <td style="width:25%; text-align: center;">RUNWAY 15</td> <td style="width:25%; text-align: center;">RUNWAY 33</td> <td style="width:25%;"></td> </tr> <tr> <td>TAILWIND LIMITS</td> <td>*** CROSSWIND LIMITS ***</td> <td>*** CROSSWIND LIMITS ***</td> <td></td> </tr> <tr> <td>1 TO 4</td> <td>1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES</td> <td>1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES</td> <td></td> </tr> <tr> <td>5 TO 9</td> <td>3.91 4.59 .00 .00 .00</td> <td>8.50 17.35 3.06 1.19 .00</td> <td></td> </tr> <tr> <td>10- UP</td> <td>.00 1.36 1.19 .17 .00</td> <td>2.72 28.23 1.53 .00 .00</td> <td></td> </tr> <tr> <td>TOTAL</td> <td>3.91 5.95 2.04 .17 .17</td> <td>12.59 46.26 30.10 5.27 .17</td> <td></td> </tr> <tr> <td></td> <td></td> <td>ZERO CROSS</td> <td>ZERO TOTAL</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>2.04 25.81</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>.51 30.27</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>.00 30.44</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>2.55 86.52</td> </tr> </table> | | | | | | | | | RUNWAY 15 | RUNWAY 33 | | TAILWIND LIMITS | *** CROSSWIND LIMITS *** | *** CROSSWIND LIMITS *** | | 1 TO 4 | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | | 5 TO 9 | 3.91 4.59 .00 .00 .00 | 8.50 17.35 3.06 1.19 .00 | | 10- UP | .00 1.36 1.19 .17 .00 | 2.72 28.23 1.53 .00 .00 | | TOTAL | 3.91 5.95 2.04 .17 .17 | 12.59 46.26 30.10 5.27 .17 | | | | ZERO CROSS | ZERO TOTAL | | | .00 .00 .00 .00 .00 | 2.04 25.81 | | | .00 .00 .00 .00 .00 | .51 30.27 | | | .00 .00 .00 .00 .00 | .00 30.44 | | | .00 .00 .00 .00 .00 | 2.55 86.52 |
| | RUNWAY 15 | RUNWAY 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWIND LIMITS | *** CROSSWIND LIMITS *** | *** CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 TO 4 | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 TO 9 | 3.91 4.59 .00 .00 .00 | 8.50 17.35 3.06 1.19 .00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10- UP | .00 1.36 1.19 .17 .00 | 2.72 28.23 1.53 .00 .00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL | 3.91 5.95 2.04 .17 .17 | 12.59 46.26 30.10 5.27 .17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ZERO CROSS | ZERO TOTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | 2.04 25.81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | .51 30.27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | .00 30.44 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | 2.55 86.52 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="0" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:25%;"></td> <td style="width:25%; text-align: center;">RUNWAY 15</td> <td style="width:25%; text-align: center;">RUNWAY 33</td> <td style="width:25%;"></td> </tr> <tr> <td>TAILWIND LIMITS</td> <td>*** CROSSWIND LIMITS ***</td> <td>*** CROSSWIND LIMITS ***</td> <td></td> </tr> <tr> <td>1 TO 4</td> <td>1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES</td> <td>1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES</td> <td></td> </tr> <tr> <td>5 TO 9</td> <td>2.55 2.04 .00 .00 .00</td> <td>4.19 17.01 2.89 1.02 .68</td> <td></td> </tr> <tr> <td>10- UP</td> <td>.00 2.00 .00 .00 .00</td> <td>3.74 30.10 1.70 .00 .17</td> <td></td> </tr> <tr> <td>TOTAL</td> <td>2.55 4.04 1.36 .00 .00</td> <td>9.35 47.79 31.97 4.25 1.02</td> <td></td> </tr> <tr> <td></td> <td></td> <td>ZERO CROSS</td> <td>ZERO TOTAL</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>1.19 22.96</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>.94 52.31</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>.17 31.63</td> </tr> <tr> <td></td> <td></td> <td>.00 .00 .00 .00 .00</td> <td>1.70 86.90</td> </tr> </table> | | | | | | | | | RUNWAY 15 | RUNWAY 33 | | TAILWIND LIMITS | *** CROSSWIND LIMITS *** | *** CROSSWIND LIMITS *** | | 1 TO 4 | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | | 5 TO 9 | 2.55 2.04 .00 .00 .00 | 4.19 17.01 2.89 1.02 .68 | | 10- UP | .00 2.00 .00 .00 .00 | 3.74 30.10 1.70 .00 .17 | | TOTAL | 2.55 4.04 1.36 .00 .00 | 9.35 47.79 31.97 4.25 1.02 | | | | ZERO CROSS | ZERO TOTAL | | | .00 .00 .00 .00 .00 | 1.19 22.96 | | | .00 .00 .00 .00 .00 | .94 52.31 | | | .00 .00 .00 .00 .00 | .17 31.63 | | | .00 .00 .00 .00 .00 | 1.70 86.90 |
| | RUNWAY 15 | RUNWAY 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TAILWIND LIMITS | *** CROSSWIND LIMITS *** | *** CROSSWIND LIMITS *** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 TO 4 | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | 1 TO 4 5 TO 9 10TO14 15TO19 20TO24 PERCENTAGES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 TO 9 | 2.55 2.04 .00 .00 .00 | 4.19 17.01 2.89 1.02 .68 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10- UP | .00 2.00 .00 .00 .00 | 3.74 30.10 1.70 .00 .17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL | 2.55 4.04 1.36 .00 .00 | 9.35 47.79 31.97 4.25 1.02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ZERO CROSS | ZERO TOTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | 1.19 22.96 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | .94 52.31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | .17 31.63 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | .00 .00 .00 .00 .00 | 1.70 86.90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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TABLE 12.3. (Concluded)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF DEC. | | NUMBER OBS. 588 | | RUNWAY 15 | | CROSSWIND LIMITS | | PERCENTAGES | | TOTAL | | ZERO CROSS | | TOTAL | | |
|-----------------|--------|-------------------------|--------|---------------|--------|-----------------|--------|-----------|--------|------------------|--------|-------------|--------|--------|--------|------------|--------|--------|--------|--------|
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 | 1 TO 4 | 5 TO 9 |
| 1 TO 4 | 2.04 | 1.19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | 1.19 | .51 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-UP | .02 | .00 | .34 | .17 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 2.04 | 2.38 | .85 | .17 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF DEC. | | NUMBER OBS. 588 | | RUNWAY 15 | | CROSSWIND LIMITS | | PERCENTAGES | | TOTAL | | ZERO CROSS | | TOTAL | | |
| 1 TO 4 | 1.70 | 1.19 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | 1.53 | .51 | .17 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | .69 | .17 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.70 | 2.72 | 1.19 | .34 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF DEC. | | NUMBER OBS. 588 | | RUNWAY 33 | | CROSSWIND LIMITS | | PERCENTAGES | | TOTAL | | ZERO CROSS | | TOTAL | | |
| 1 TO 4 | 2.89 | 1.36 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | 1.19 | .68 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 10-UP | .00 | .00 | 1.02 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 2.89 | 2.55 | 1.70 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

TABLE 12.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

| MRS | NSC PEAK WINDS | | | HEAD/TAIL WIND REVERSALS | | | MONTH OF DEC. | | |
|-------|----------------------|----------------------|----------------------|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 01-02 | 6.59 | 3.58 | 3.01 | 3.85 | 8.09 | 8.63 | 8.60 | 35.86 | 5.18 |
| 01-06 | 3.04 | 3.75 | 3.29 | 4.04 | 4.96 | 6.52 | 4.26 | 37.13 | 4.81 |
| 06-06 | 8.46 | 4.26 | 4.20 | 4.67 | 47.44 | 10.16 | 4.88 | 44.93 | 5.53 |
| 08-11 | 11.93 | 6.36 | 5.57 | 7.07 | 55.88 | 12.61 | 6.70 | 51.23 | 7.57 |
| 12-14 | 10.79 | 5.24 | 5.51 | 5.92 | 50.79 | 11.13 | 5.39 | 46.54 | 6.15 |
| 14-17 | 10.34 | 5.11 | 5.22 | 5.71 | 49.73 | 11.24 | 5.96 | 44.71 | 6.76 |
| 14-20 | 8.18 | 3.24 | 4.94 | 3.63 | 45.31 | 9.94 | 4.15 | 40.48 | 4.84 |
| 21-23 | 6.64 | 3.41 | 3.24 | 3.64 | 50.89 | 8.63 | 4.99 | 42.20 | 4.97 |
| 00-23 | 8.75 | 4.37 | 4.37 | 4.80 | 48.73 | 10.11 | 5.05 | 42.89 | 5.73 |

| MRS | NSC PEAK WINDS | | | HEAD/TAIL WIND REVERSALS | | | MONTH OF DEC. | | |
|-------|----------------------|----------------------|----------------------|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS | PERCENTAGE REVERSALS |
| 00-02 | 1.71 | 1.77 | 1.77 | .37 | 3.85 | 17.17 | 9.60 | 9.09 | 35.86 |
| 01-06 | 2.63 | .92 | 1.01 | .49 | 4.04 | 21.29 | 9.90 | 5.94 | 37.13 |
| 04-08 | 2.12 | 1.01 | 1.01 | .75 | 4.67 | 17.07 | 14.49 | 12.56 | 44.93 |
| 06-11 | .50 | 3.97 | 3.97 | 2.59 | 7.07 | 10.84 | 9.85 | 30.54 | 51.23 |
| 12-14 | .13 | 2.68 | 2.68 | 3.12 | 5.92 | 9.68 | 3.69 | 33.18 | 46.54 |
| 14-17 | 1.14 | 2.66 | 2.66 | 1.90 | 5.71 | 13.46 | 8.65 | 22.60 | 44.71 |
| 14-20 | 1.59 | 1.91 | 1.91 | .13 | 3.63 | 20.63 | 11.51 | 8.33 | 40.48 |
| 21-23 | 1.88 | 1.03 | 1.03 | .71 | 3.64 | 21.39 | 10.98 | 9.83 | 42.20 |
| 00-23 | 1.47 | 2.08 | 2.08 | 1.25 | 4.80 | 16.51 | 9.82 | 16.57 | 42.89 |

*** RUNWAY 15 *** GIVEN A HEADWIND
 HEAD-WIND-TAIL-WIND
 PERCENTAGE REVERSALS PERCENTAGE REVERSALS
 REVERSALS REVERSALS REVERSALS
 TOTAL HEAD-TAIL TAIL-HEAD TO TAIL TO HEAD

*** RUNWAY 33 *** GIVEN A HEADWIND
 HEAD-WIND-TAIL-WIND
 PERCENTAGE REVERSALS PERCENTAGE REVERSALS
 REVERSALS REVERSALS REVERSALS
 TOTAL HEAD-TAIL TAIL-HEAD TO TAIL TO HEAD

*** RUNWAY 15 *** GIVEN A HEADWIND
 HEADWIND TO TAILWIND REVERSALS
 MONTH OF DEC.

*** RUNWAY 33 *** GIVEN A HEADWIND
 HEADWIND TO TAILWIND REVERSALS
 MONTH OF DEC.

*** RUNWAY 15 *** GIVEN A HEADWIND
 RESULTANT TAILWIND MAGNITUDE
 TOTAL

*** RUNWAY 33 *** GIVEN A HEADWIND
 RESULTANT TAILWIND MAGNITUDE
 TOTAL

12.4A

12.4B

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TABLE 12.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE
PERCENTAGE FREQUENCIES BY RUNWAY END

| RUNWAY COMPONENT CLASS | HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF DEC. | | | | | | | | | | | |
|------------------------------|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 04-08 | | 09-14 | | 15-19 | | 20-24 | | 25-30 | | 31-36 | |
| | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF | HOURS CPF |
| 1-1 | 9.49 | 4.35 | 2.12 | 2.81 | 4.79 | 25.36 | 14.29 | 11.98 | 11.06 | 15.65 | 11.06 | 15.65 |
| 1-2 | 14.37 | 9.70 | 5.79 | 3.93 | 8.48 | 31.58 | 16.26 | 11.98 | 11.06 | 17.68 | 11.06 | 17.68 |
| 2-3 | 18.03 | 10.58 | 6.29 | 5.00 | 10.02 | 51.20 | 21.18 | 12.48 | 13.94 | 24.61 | 13.94 | 24.61 |
| 3-4 | 26.62 | 14.99 | 8.74 | 6.94 | 13.82 | 62.20 | 29.09 | 13.94 | 16.03 | 30.11 | 16.03 | 30.11 |
| 4-5 | 32.28 | 17.63 | 7.31 | 10.20 | 16.05 | 70.81 | 34.48 | 17.97 | 22.12 | 34.20 | 17.97 | 34.20 |
| 5-6 | 40.61 | 17.63 | 4.85 | 14.31 | 20.44 | 79.43 | 41.29 | 26.73 | 37.50 | 47.55 | 26.73 | 47.55 |
| 6-7 | 45.90 | 21.66 | 11.19 | 18.62 | 24.45 | 81.34 | 56.65 | 32.26 | 41.35 | 52.69 | 32.26 | 52.69 |
| 7-8 | 51.74 | 25.08 | 15.19 | 24.64 | 29.47 | 84.21 | 64.04 | 36.08 | 51.44 | 61.29 | 36.08 | 61.29 |
| 8-9 | 55.97 | 29.85 | 18.94 | 30.27 | 33.87 | 87.56 | 69.46 | 56.22 | 56.73 | 67.38 | 56.22 | 67.38 |
| 9-10 | 64.23 | 39.17 | 29.75 | 44.78 | 44.63 | 90.91 | 73.89 | 64.52 | 65.07 | 73.72 | 64.52 | 73.72 |
| 10-11 | 69.03 | 45.28 | 36.04 | 52.12 | 50.93 | 93.30 | 78.82 | 69.12 | 70.67 | 77.90 | 69.12 | 77.90 |
| 11-12 | 72.89 | 50.69 | 43.27 | 58.64 | 56.44 | 93.78 | 84.24 | 73.27 | 75.00 | 81.48 | 73.27 | 81.48 |
| 12-13 | 77.36 | 58.50 | 52.34 | 66.18 | 63.67 | 94.26 | 89.16 | 79.26 | 81.25 | 85.90 | 79.26 | 85.90 |
| 13-14 | 80.22 | 63.16 | 58.23 | 70.80 | 68.16 | 96.17 | 91.13 | 82.03 | 84.62 | 88.41 | 82.03 | 88.41 |
| 14-15 | 83.15 | 70.47 | 65.27 | 76.74 | 73.94 | 96.65 | 92.12 | 88.94 | 91.35 | 92.23 | 88.94 | 92.23 |
| 15-16 | 86.24 | 76.76 | 71.65 | 81.34 | 79.08 | 96.65 | 94.58 | 91.24 | 93.27 | 93.91 | 91.24 | 93.91 |
| 16-17 | 89.24 | 80.06 | 77.11 | 85.31 | 83.16 | 98.09 | 96.55 | 94.93 | 96.15 | 96.42 | 94.93 | 96.42 |
| 17-18 | 91.82 | 84.19 | 82.07 | 87.71 | 86.31 | 98.56 | 98.52 | 97.24 | 96.63 | 97.73 | 97.24 | 97.73 |
| 18-19 | 94.40 | 89.23 | 86.46 | 91.07 | 90.31 | 99.04 | 98.52 | 97.70 | 97.12 | 98.09 | 97.70 | 98.09 |
| 19-20 | 96.39 | 93.14 | 91.61 | 95.06 | 94.05 | 99.52 | 99.51 | 98.16 | 98.08 | 98.81 | 98.16 | 98.81 |
| 20-21 | 96.95 | 94.58 | 93.64 | 96.01 | 95.31 | 99.52 | 99.51 | 98.62 | 98.08 | 98.92 | 98.62 | 98.92 |
| 21-22 | 97.51 | 96.28 | 95.55 | 97.02 | 96.60 | 100.00 | 99.51 | 100.00 | 99.04 | 99.64 | 100.00 | 99.64 |
| 22-23 | 98.27 | 97.17 | 96.31 | 97.53 | 97.31 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 23-24 | 99.00 | 98.11 | 97.08 | 98.04 | 98.06 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 24-25 | 99.25 | 98.61 | 97.57 | 98.73 | 98.53 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 25-26 | 99.50 | 98.93 | 98.28 | 98.86 | 98.66 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 26-27 | 99.56 | 99.12 | 98.86 | 99.14 | 99.18 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 27-28 | 99.63 | 99.54 | 99.24 | 99.49 | 99.48 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 28-29 | 99.81 | 99.56 | 99.49 | 99.75 | 99.65 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 29-30 | 99.88 | 99.69 | 99.75 | 99.87 | 99.80 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 30-31 | 100.00 | 99.81 | 99.81 | 99.94 | 99.89 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 31-32 | 100.00 | 99.67 | 99.81 | 100.00 | 99.92 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 32-33 | 100.00 | 99.94 | 99.87 | 100.00 | 99.95 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 33-34 | 100.00 | 99.94 | 99.94 | 100.00 | 99.97 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 34-35 | 100.00 | 99.94 | 99.94 | 100.00 | 99.97 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 35-36 | 100.00 | 99.94 | 100.00 | 100.00 | 99.98 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 36-37 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| TOTALS | 1608 | 1588 | 1573 | 1579 | 6348 | 209 | 207 | 217 | 208 | 837 | 208 | 837 |

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TABLE 13.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

| MRS | MSC PEAK WINDS MONTH OF ANNUAL CROSSWINDS | | | | | ZERO CROSSWIND | TOTAL NUMBER OBS. |
|-------|---|--------|----------|----------|----------|----------------|-------------------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | |
| 0-12 | 56.70 | 29.16 | 4.35 | 1.28 | .36 | 0.35 | 19993 |
| 13-15 | 58.82 | 25.77 | 4.22 | 1.47 | .39 | 9.24 | 19992 |
| 16-18 | 52.65 | 32.71 | 5.27 | 1.46 | .53 | 7.69 | 19997 |
| 19-21 | 29.60 | 54.00 | 9.31 | 3.04 | .76 | 3.56 | 19992 |
| 22-24 | 18.17 | 66.37 | 10.72 | 3.08 | .94 | 2.33 | 19996 |
| 25-27 | 23.22 | 61.00 | 13.27 | 2.25 | .71 | 2.26 | 19994 |
| 28-30 | 43.36 | 40.11 | 5.35 | 1.24 | .35 | 4.50 | 19993 |
| 31-33 | 54.74 | 32.56 | 4.11 | 1.04 | .27 | 7.15 | 19990 |
| 00-23 | 42.48 | 42.71 | 6.66 | 1.86 | .54 | 5.57 | 159938 |

TABLE 13.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

| MRS | MSC PEAK WINDS MONTH OF ANNUAL TAILWINDS | | | | | TOTAL NUMBER OBS. | RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4 | PERCENTAGES | RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 5 TO 9 | PERCENTAGES | TOTAL NUMBER OBS. |
|-------|--|--------|----------|----------|----------|-------------------|--|-------------|--|-------------|-------------------|
| | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | | | | | | |
| 0-12 | 2.62 | 1.41 | .67 | .76 | .67 | 19990 | 25.84 | 38.10 | 27.36 | 19990 | |
| 13-15 | 3.29 | 1.42 | .76 | .95 | .76 | 19992 | 31.10 | 35.40 | 23.10 | 19992 | |
| 16-18 | 3.69 | 1.94 | .95 | 1.88 | .95 | 19992 | 25.18 | 34.45 | 29.42 | 19992 | |
| 19-21 | 1.09 | 3.18 | 1.88 | 2.32 | 1.88 | 19995 | 6.22 | 28.68 | 56.83 | 19995 | |
| 22-24 | .21 | 1.13 | 2.32 | 2.12 | 2.12 | 19994 | 7.13 | 18.07 | 73.20 | 19994 | |
| 25-27 | .38 | 1.76 | 2.12 | 1.19 | 1.19 | 19993 | 3.27 | 24.49 | 66.78 | 19993 | |
| 28-30 | 2.15 | 2.08 | 1.19 | .70 | .70 | 19990 | 16.14 | 37.15 | 38.68 | 19990 | |
| 31-33 | 2.70 | 1.66 | .70 | 1.31 | .70 | 159938 | 22.27 | 37.63 | 31.60 | 159938 | |
| 00-23 | 2.01 | 1.93 | 1.31 | 1.31 | 1.31 | 159938 | 16.54 | 31.80 | 43.28 | 159938 | |

TABLE 13.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | MONTH OF ANNUAL | | NUMBER OBS. 6664 | |
|-----------------|--------|-------------------------|----------|-----------------|----------|------------------|------------|
| HOUR 3 | | | | | | | |
| RUNWAY 1E | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| | 1.86 | 1.10 | .00 | .00 | .00 | .00 | .05 |
| 5 TO 9 | .00 | .62 | .57 | .38 | .21 | .00 | .00 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 1.86 | 1.71 | .97 | .53 | .21 | .00 | .05 |
| RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| | 3.00 | 2.84 | 2.81 | .84 | .26 | .11 | 3.02 |
| 5 TO 9 | 1.59 | 33.76 | 3.26 | .33 | .21 | .00 | 1.46 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 4.59 | 36.64 | 6.07 | 1.17 | .47 | .11 | 4.48 |
| RUNWAY 1E | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| | 2.12 | 1.25 | .00 | .00 | .00 | .00 | .05 |
| 5 TO 9 | .00 | .63 | .41 | .30 | .10 | .00 | .00 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 2.12 | 1.85 | .77 | .62 | .20 | .00 | .05 |
| RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| | 3.41 | 23.60 | 3.02 | .99 | .30 | .03 | 2.64 |
| 5 TO 9 | 1.31 | 33.07 | 1.04 | .32 | .10 | .00 | 1.02 |
| 10- UP | .74 | .86 | 19.73 | 2.09 | .03 | .02 | .15 |
| TOTAL | 5.45 | 57.57 | 23.78 | 3.39 | .33 | .05 | 3.81 |
| RUNWAY 1E | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| | 2.21 | 1.25 | .00 | .00 | .00 | .00 | .00 |
| 5 TO 9 | .00 | .62 | .50 | .24 | .05 | .00 | .00 |
| 10- UP | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| TOTAL | 2.21 | 1.86 | .95 | .56 | .15 | .00 | .00 |
| RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | 1 TO 5 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS |
| | 3.45 | 24.56 | 3.48 | .92 | .18 | .05 | 3.12 |
| 5 TO 9 | 1.40 | 30.84 | 1.10 | .18 | .00 | .00 | 1.28 |
| 10- UP | .90 | .84 | 19.16 | 2.16 | .03 | .02 | .12 |
| TOTAL | 5.75 | 56.24 | 23.74 | 3.24 | .21 | .06 | 4.52 |

TABLE 13.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
|-----------------|------|-------------------------|------|-----|-----|------|----------------------|-------|------|-----|-----|-----|------|-------|
| MONTH OF ANNUAL | | MONTH OF ANNUAL | | | | | | | | | | | | |
| MAY 6 | | NUMBER OBS. 6664 | | | | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | | CROSSWIND LIMITS *** | | | | | CROSSWIND LIMITS *** | | | | | | | |
| 1 TO 4 | | 1 TO 5 TO 9 | | | | | 1 TO 4 TO 9 | | | | | | | |
| 5 TO 9 | | 15 TO 19 | | | | | 15 TO 19 | | | | | | | |
| UP | | 20 TO 24 | | | | | 20 TO 24 | | | | | | | |
| TOTAL | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | |
| 1 TO 4 | 2.54 | 1.46 | .00 | .00 | .00 | 4.72 | 24.55 | 3.56 | .95 | .50 | .27 | .06 | 3.29 | 33.16 |
| 5 TO 9 | .00 | .72 | .30 | .04 | .00 | 1.49 | 29.31 | 1.10 | .36 | .17 | .00 | .00 | 1.34 | 32.76 |
| UP | .00 | .00 | .33 | .24 | .11 | .68 | .90 | 19.58 | 2.25 | .12 | .08 | .00 | .14 | 23.06 |
| TOTAL | 2.54 | 2.18 | .75 | .54 | .11 | 6.18 | 54.74 | 24.23 | 3.56 | .78 | .35 | .06 | 4.76 | 88.49 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
| MONTH OF ANNUAL | | MONTH OF ANNUAL | | | | | | | | | | | | |
| MAY 7 | | NUMBER OBS. 6664 | | | | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | | CROSSWIND LIMITS *** | | | | | CROSSWIND LIMITS *** | | | | | | | |
| 1 TO 4 | | 1 TO 5 TO 9 | | | | | 1 TO 4 TO 9 | | | | | | | |
| 5 TO 9 | | 15 TO 19 | | | | | 15 TO 19 | | | | | | | |
| UP | | 20 TO 24 | | | | | 20 TO 24 | | | | | | | |
| TOTAL | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | |
| 1 TO 4 | 2.28 | 1.68 | .00 | .00 | .00 | 3.98 | 17.99 | 3.93 | 1.11 | .57 | .29 | .03 | 2.27 | 26.19 |
| 5 TO 9 | .00 | .75 | .56 | .33 | .02 | 1.65 | 33.24 | 1.08 | .48 | .11 | .00 | .00 | 1.17 | 36.07 |
| UP | .00 | .00 | .54 | .29 | .11 | .95 | 1.14 | 23.47 | 2.31 | .12 | .05 | .00 | .12 | 27.21 |
| TOTAL | 2.28 | 2.43 | 1.10 | .62 | .12 | 6.57 | 52.37 | 24.48 | 3.97 | .80 | .33 | .03 | 3.56 | 89.47 |
| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | | | | | | | | | | | |
| MONTH OF ANNUAL | | MONTH OF ANNUAL | | | | | | | | | | | | |
| MAY 6 | | NUMBER OBS. 6664 | | | | | | | | | | | | |
| | | RUNWAY 15 | | | | | RUNWAY 33 | | | | | | | |
| TAILWIND LIMITS | | CROSSWIND LIMITS *** | | | | | CROSSWIND LIMITS *** | | | | | | | |
| 1 TO 4 | | 1 TO 5 TO 9 | | | | | 1 TO 4 TO 9 | | | | | | | |
| 5 TO 9 | | 15 TO 19 | | | | | 15 TO 19 | | | | | | | |
| UP | | 20 TO 24 | | | | | 20 TO 24 | | | | | | | |
| TOTAL | | PERCENTAGES | | | | | PERCENTAGES | | | | | | | |
| 1 TO 4 | 1.43 | 1.65 | .00 | .00 | .00 | 3.08 | 9.39 | 3.60 | 1.50 | .62 | .39 | .14 | 1.16 | 16.79 |
| 5 TO 9 | .00 | .96 | .87 | .48 | .06 | 2.37 | 32.40 | 1.52 | .78 | .14 | .02 | .00 | 1.38 | 36.22 |
| UP | .00 | .00 | .54 | .23 | .11 | .92 | 1.54 | 33.07 | 2.82 | .18 | .08 | .02 | .26 | 38.00 |
| TOTAL | 1.43 | 2.61 | 1.41 | .71 | .17 | 6.36 | 43.37 | 38.19 | 5.17 | .93 | .48 | .15 | 2.79 | 91.01 |

TABLE 13.3. (Continued)

| ASC PEAR WINDS | | TAILWINDS VS CROSSWINDS | | NUMBER OPS. 6663 | | RUMWAY 33 | | CROSSWIND LIMITS | | PERCENTAGES | | ZERO CROSS | | 25- UP | | TOTAL | |
|-------------------------|--------|-------------------------|-----------------|------------------|--------|-----------|--------|------------------|--------|-------------|--------|------------|--------|--------|--------|--------|--------|
| MONTH OF ANNUAL | MCUP 9 | MCUP 9 | MONTH OF ANNUAL | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 | MCUP 9 |
| 1 TO 4 | .66 | 1.34 | .00 | .00 | .02 | 3.87 | 2.57 | 1.32 | .84 | .36 | .12 | .26 | 9.26 | | | | |
| 5 TO 9 | .00 | 1.34 | .00 | .00 | .00 | 29.84 | 1.78 | 1.02 | .81 | .00 | .00 | .00 | 23.53 | | | | |
| 10- UP | .00 | .00 | .00 | .00 | .00 | 1.53 | 1.67 | 1.96 | .74 | .05 | .00 | .00 | 42.44 | | | | |
| TOTAL | .66 | 2.68 | .00 | .00 | .02 | 6.63 | 45.82 | 6.37 | 1.56 | .41 | .12 | 1.00 | 91.27 | | | | |
| MSC PEAR WINDS | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | |
| MONTH OF ANNUAL | | | | | | | | | | | | | | | | | |
| NUMBER OPS. 6665 | | | | | | | | | | | | | | | | | |
| RUMWAY 33 | | | | | | | | | | | | | | | | | |
| CROSSWIND LIMITS | | | | | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | | | | | |
| 1 TO 4 | .23 | .64 | .00 | .00 | .00 | 1.49 | 1.65 | 1.19 | .92 | .39 | .14 | .05 | 5.81 | | | | |
| 5 TO 9 | .00 | 1.05 | .00 | .00 | .00 | 25.43 | 1.30 | .99 | .99 | .02 | .00 | .00 | 29.73 | | | | |
| 10- UP | .00 | .00 | .00 | .00 | .00 | 2.37 | 49.08 | 5.04 | .23 | .05 | .06 | .18 | 55.92 | | | | |
| TOTAL | .23 | 1.73 | .00 | .00 | .00 | 6.33 | 29.21 | 7.22 | 1.50 | .45 | .20 | .71 | 91.46 | | | | |
| MSC PEAR WINDS | | | | | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | | | | | |
| MONTH OF ANNUAL | | | | | | | | | | | | | | | | | |
| NUMBER OPS. 6664 | | | | | | | | | | | | | | | | | |
| RUMWAY 33 | | | | | | | | | | | | | | | | | |
| CROSSWIND LIMITS | | | | | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | | | | | |
| 1 TO 4 | .08 | .27 | .00 | .00 | .00 | .50 | .95 | .90 | .68 | .36 | .09 | .02 | 3.59 | | | | |
| 5 TO 9 | .00 | .74 | .00 | .00 | .00 | 20.34 | 1.53 | 1.05 | .39 | .03 | .00 | .00 | 23.77 | | | | |
| 10- UP | .00 | .00 | .00 | .00 | .00 | 2.24 | 56.38 | 5.84 | .32 | .20 | .11 | .23 | 65.08 | | | | |
| TOTAL | .08 | 1.01 | .00 | .00 | .00 | 5.09 | 58.65 | 7.79 | 1.38 | .59 | .20 | .65 | 92.44 | | | | |

TABLE 13.3. (Continued)

| KSC PEAK WINDS | | TAILWINDS VS CROSSWINDS | | NUMBER OPS. 6664 | | RUNWAY 33 | | ZERO CROSS | | 25- UP | | TOTAL | |
|-------------------------|-------------|-------------------------|-------------|------------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|
| MONTH OF ANNUAL | | MONTH OF ANNUAL | | MONTH OF ANNUAL | | MONTH OF ANNUAL | | MONTH OF ANNUAL | | MONTH OF ANNUAL | | MONTH OF ANNUAL | |
| TAILWIND LIMITS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP | ZERO CROSS | 1 TO 4 | 5 TO 9 | 10 TO 14 | 15 TO 19 | 20 TO 24 | 25- UP |
| PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES | PERCENTAGES |
| 1 TO 4 | .95 | .65 | .00 | .00 | .00 | .00 | .00 | 1.59 | .95 | .24 | .08 | .08 | .02 |
| 5 TO 9 | .00 | .98 | .56 | .39 | .00 | .00 | .00 | 1.95 | 30.17 | 3.69 | .12 | .00 | .01 |
| 10- UP | .00 | .00 | .00 | .29 | .00 | .00 | .00 | 1.62 | .51 | 40.68 | 4.43 | .06 | .06 |
| TOTAL | 1.56 | 1.62 | 1.46 | .77 | .32 | .00 | .00 | 5.16 | 39.97 | 45.31 | 4.97 | .65 | .08 |
| KSC PEAK WINDS | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF ANNUAL | | | | | | | | | | | | | |
| NUMBER OPS. 6664 | | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | | |
| CROSSING LIMITS *** | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | |
| 1 TO 4 | 1.56 | .96 | .00 | .00 | .00 | .00 | .00 | 2.52 | 13.70 | 1.20 | .32 | .08 | .05 |
| 5 TO 9 | .00 | 1.11 | .50 | .45 | .00 | .00 | .00 | 2.09 | 34.66 | 7.08 | .27 | .21 | .00 |
| 10- UP | .00 | .00 | .00 | .24 | .00 | .00 | .00 | 1.05 | .77 | 21.87 | 3.17 | .20 | .02 |
| TOTAL | 1.56 | 2.07 | 1.14 | .69 | .17 | .00 | .00 | 5.66 | 49.13 | 36.15 | 3.75 | .53 | .06 |
| KSC PEAK WINDS | | | | | | | | | | | | | |
| TAILWINDS VS CROSSWINDS | | | | | | | | | | | | | |
| MONTH OF ANNUAL | | | | | | | | | | | | | |
| NUMBER OPS. 6664 | | | | | | | | | | | | | |
| RUNWAY 33 | | | | | | | | | | | | | |
| CROSSING LIMITS *** | | | | | | | | | | | | | |
| PERCENTAGES | | | | | | | | | | | | | |
| 1 TO 4 | 1.44 | .89 | .00 | .00 | .00 | .00 | .00 | 2.74 | 17.05 | 1.29 | .38 | .12 | .02 |
| 5 TO 9 | .00 | 1.37 | .48 | .33 | .02 | .00 | .00 | 2.19 | 34.09 | 2.25 | .32 | .14 | .00 |
| 10- UP | .00 | .00 | .00 | .20 | .11 | .00 | .00 | .89 | .95 | 29.38 | 3.02 | .20 | .03 |
| TOTAL | 1.44 | 2.25 | 1.02 | .53 | .12 | .00 | .00 | 5.42 | 52.06 | 32.92 | 3.71 | .56 | .05 |

TABLE 13.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

| DAILY COMPONENT WINDS | HEADWIND CUMULATIVE PERCENTAGE FREQUENCY MONTH OF ANNUAL | | | | | | | | | | | |
|-----------------------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | MAY | | | | JUNE | | | | JULY | | | |
| | HOURS 06-00 CPF | HOURS 06-17 CPF | HOURS 15-17 CPF | HOURS 18-24 CPF | HOURS 06-00 CPF | HOURS 06-17 CPF | HOURS 15-17 CPF | HOURS 18-24 CPF | HOURS 06-00 CPF | HOURS 06-17 CPF | HOURS 15-17 CPF | HOURS 18-24 CPF |
| 1-1 | 8.37 | 3.58 | 2.29 | 4.17 | 4.17 | 39.17 | 25.97 | 29.47 | 30.93 | 32.33 | 32.33 | 32.33 |
| 1-2 | 12.16 | 5.81 | 3.37 | 6.05 | 6.05 | 44.73 | 26.53 | 29.60 | 31.17 | 34.08 | 34.08 | 34.08 |
| 2-3 | 16.53 | 6.48 | 3.70 | 7.51 | 7.51 | 59.14 | 29.31 | 30.28 | 32.47 | 39.96 | 39.96 | 39.96 |
| 3-4 | 24.70 | 7.58 | 3.90 | 10.07 | 10.07 | 66.68 | 33.35 | 30.89 | 34.25 | 43.99 | 43.99 | 43.99 |
| 4-5 | 31.35 | 8.92 | 4.22 | 12.40 | 12.40 | 74.08 | 38.91 | 32.77 | 37.09 | 48.84 | 48.84 | 48.84 |
| 5-6 | 40.57 | 11.91 | 5.19 | 16.26 | 16.26 | 79.98 | 47.24 | 37.85 | 44.24 | 55.99 | 55.99 | 55.99 |
| 6-7 | 46.71 | 15.19 | 6.27 | 19.50 | 19.50 | 82.93 | 55.35 | 42.39 | 47.56 | 61.19 | 61.19 | 61.19 |
| 7-8 | 53.00 | 19.92 | 8.43 | 23.71 | 23.71 | 86.51 | 62.11 | 49.13 | 53.25 | 65.68 | 65.68 | 65.68 |
| 8-9 | 58.48 | 25.51 | 11.78 | 28.38 | 28.38 | 89.46 | 69.49 | 57.03 | 59.33 | 71.46 | 71.46 | 71.46 |
| 9-10 | 68.58 | 39.45 | 23.23 | 40.43 | 40.43 | 91.83 | 77.34 | 64.95 | 65.58 | 77.20 | 77.20 | 77.20 |
| 10-11 | 73.86 | 48.39 | 32.58 | 48.49 | 48.49 | 93.52 | 81.27 | 69.80 | 69.89 | 81.64 | 81.64 | 81.64 |
| 11-12 | 77.59 | 55.43 | 41.00 | 55.14 | 55.14 | 94.25 | 83.81 | 73.23 | 74.10 | 83.14 | 83.14 | 83.14 |
| 12-13 | 81.90 | 63.96 | 52.24 | 63.73 | 63.73 | 95.36 | 89.24 | 81.91 | 81.09 | 88.87 | 88.87 | 88.87 |
| 13-14 | 84.67 | 69.16 | 61.97 | 68.97 | 68.97 | 95.99 | 92.33 | 87.59 | 83.69 | 92.08 | 92.08 | 92.08 |
| 14-15 | 87.44 | 75.14 | 66.82 | 74.87 | 74.87 | 97.20 | 94.57 | 90.61 | 89.64 | 94.53 | 94.53 | 94.53 |
| 15-16 | 89.77 | 79.70 | 72.95 | 79.39 | 79.39 | 98.04 | 96.92 | 94.17 | 94.64 | 97.31 | 97.31 | 97.31 |
| 16-17 | 91.61 | 83.75 | 78.36 | 83.44 | 83.44 | 98.98 | 97.82 | 95.84 | 96.19 | 98.68 | 98.68 | 98.68 |
| 17-18 | 93.17 | 86.54 | 82.26 | 86.36 | 86.36 | 99.27 | 98.61 | 96.74 | 97.65 | 99.51 | 99.51 | 99.51 |
| 18-19 | 94.96 | 90.55 | 86.92 | 90.07 | 90.07 | 99.66 | 99.34 | 98.18 | 97.89 | 99.76 | 99.76 | 99.76 |
| 19-20 | 96.91 | 94.22 | 91.89 | 93.86 | 93.86 | 99.76 | 99.46 | 98.71 | 98.92 | 99.87 | 99.87 | 99.87 |
| 20-21 | 97.52 | 95.40 | 93.57 | 95.13 | 95.13 | 99.95 | 99.70 | 99.24 | 99.43 | 99.94 | 99.94 | 99.94 |
| 21-22 | 98.27 | 96.88 | 95.27 | 96.46 | 96.46 | 100.00 | 99.82 | 99.55 | 99.65 | 99.98 | 99.98 | 99.98 |
| 22-23 | 98.54 | 97.52 | 96.06 | 97.11 | 97.11 | 100.00 | 99.82 | 99.55 | 99.51 | 99.92 | 99.92 | 99.92 |
| 23-24 | 98.92 | 98.12 | 97.19 | 97.89 | 97.89 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 24-25 | 99.14 | 98.59 | 97.81 | 98.37 | 98.37 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 25-26 | 99.35 | 98.92 | 98.32 | 98.75 | 98.75 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 26-27 | 99.49 | 99.16 | 98.73 | 99.04 | 99.04 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 27-28 | 99.59 | 99.36 | 99.04 | 99.28 | 99.28 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 28-29 | 99.67 | 99.48 | 99.20 | 99.41 | 99.41 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 29-30 | 99.78 | 99.66 | 99.52 | 99.62 | 99.62 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 30-31 | 99.85 | 99.76 | 99.65 | 99.72 | 99.72 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 31-32 | 99.87 | 99.82 | 99.72 | 99.77 | 99.77 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 32-33 | 99.89 | 99.86 | 99.78 | 99.82 | 99.82 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 33-34 | 99.91 | 99.87 | 99.81 | 99.85 | 99.85 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 34-35 | 99.93 | 99.89 | 99.85 | 99.88 | 99.88 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 35-36 | 99.94 | 99.91 | 99.87 | 99.90 | 99.90 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 36-37 | 99.95 | 99.94 | 99.92 | 99.93 | 99.93 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 37-38 | 99.96 | 99.95 | 99.93 | 99.94 | 99.94 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |
| 38-39 | 99.96 | 99.96 | 99.96 | 99.96 | 99.96 | 100.00 | 99.82 | 99.55 | 99.92 | 99.92 | 99.92 | 99.92 |

APPROVAL

GROUND WINDS FOR KENNEDY SPACE CENTER, FLORIDA (1978 VERSION)

By D. L. Johnson and S. C. Brown

The information in this report has been reviewed for technical content. Review of any information concerning Department of Defense or nuclear energy activities or programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

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