D. Comments on the Statistical Treatment and Accuracy of the D&M Results.

1. The accuracy of calculated hydrograph relative to the observed hydrograph was checked by D&M by the following methods: a) A point-by-point comparison of percent difference between the two hydrographs at each time step, b) computing the sum of the squares of the difference between the two hydrographs for the duration of the hydrograph, and c) comparing the average percent differences of sections of the hydrographs.

2. All three methods are very similar. Method (a) presents the problem in that if the recorded and calculated hydrographs are out of phase with the same general shape, something which is not uncommon, point-by-point comparison of percent differences is very misleading. Furthermore there may be positive as well as negative differences when the hydrographs cross. All of the hydrographs analyzed by D&M are out of phase, and cross. Method (b) that of using the sum of the squares of differences between the two hydrographs presents the problem in that the hydrographs again are out of phase and, in addition, by squaring the sums even the negative differences become positive and the "best fit" is not a true "best fit." Method (c), that of looking at the average percent differences of sections of the hydrographs and comparing each one-third portion with emphasis on the middle-third portion of the hydrograph, is equally ineffective as a statistical method of comparison for the same reasons as cited for method (a) and (b).

3. To check on the validity of the D&M wind stress equation using their coefficients and their pressure-dependent factor and in order to compare it to CERC's wind stress equation, using the same bottom friction factor, the following test was applied. Using the parameters of the probable maximum hurricane, PMH, (P_o = 26.7 in. of Hg., P_n = 31.25 in. Hg., R = 24 n. mi., V_t = 20 knots, and U_{max} = 149.9 mph) wind speeds and pressures were calculated along the hurricane's prime vector for increasing integer distance intervals of the ratio, r/R. Utilizing these data, both the D&M and CERC wind stress equations were solved and respective values of wind stress coefficients were tabulated in Table 1. To illustrate graphically the differences of both the CERC with D&M wind stress coefficients with increasing wind speeds, a plot was prepared (Figure 1). The percent difference between the CERC and the D&M wind stress coefficients were similarly calculated for each wind speed interval and plotted on the same graph. Examination of these graphs indicates that both the CERC and D&M wind stress coefficients have approximately the same initial values up to wind speeds of 20 mph. Beyond wind speeds of 20 mph, the CERC calculated wind stress coefficient increases at a greater rate than the D&M coefficient; at 30 mph, the difference increases to 9%, at 50 mph to 18.5%, and at 100 mph to 25.2%. Also apparent from this graph is that the pressure factor introduced in the D&M wind stress calculation, cannot possibly

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compensate for increased stress due to stronger winds as the region of maximum winds is approached. As shown, the speeds between 80-90 mph the D&M wind stress coefficient approaches a plateau value and retains the same or an even lower value in the vicinity of maximum winds (149.9 mph). This does not appear to be consistent with previous investigations since wind speed is a more important factor than atmospheric pressure in determining the wind stress.

TABLE 1

Comparison of CERC and Dames and Moore
Wind Stress Coefficients

r/R	W	P	CERC - k	D&M - K	Difference %
1	149.9	28.4	3.40×10^{-6}	2.37×10^{-6}	30.39
2	137.9	29.5	3.36 "	2.44 "	27.47
3	100.0	30.0	3.15 "	2.36 "	25.11
4	86.6	30.2	3.04 "	2.31 "	23.9
5	76.4	30.4	2.93 "	2.26 "	22.7
6	68.2	30.6	2.82 "	2.22 "	21.46
7	60.6	30.6	2.70 "	2.15 "	20.5
8	53.7	30.7	2.57 "	2.07 "	19.2
9	48.0	30.8	2.43 "	2.00 "	17.7
10	43.0	30.8	2.29 "	1.92 "	16.3
12	34.8	30.9	2.01 "	1.76 "	12.8
14	28.9	30.9	1.76 "	1.60 "	9.0
16	24.3	31.0	1.53 "	1.46 "	4.6
18	20.5	31.0	1.34 "	1.33 "	0.62
20	16.9	31.0	1.22 "	1.23 "	- 1.29
22	13.8	31.0	1.21 "	1.21 "	0

Wind Stress Equations.

<u>CERC</u> $k = 1.1 \left[1.1 \times 10^{-6} + 2.5 \times 10^{-6} \left(1 - \frac{16}{W}\right)^2\right]$

<u>or</u> $k - 1.21 \times 10^{-6} + 2.75 \times 10^{-6} \left(1 - \frac{16}{W}\right)^2$

<u>D&M</u> $k = \left[1.0 \times 10^{-6} + 1.4 \times 10^{-6} \left(1 - \frac{15}{W}\right)^2\right] \times \frac{1.17P}{29.92}$

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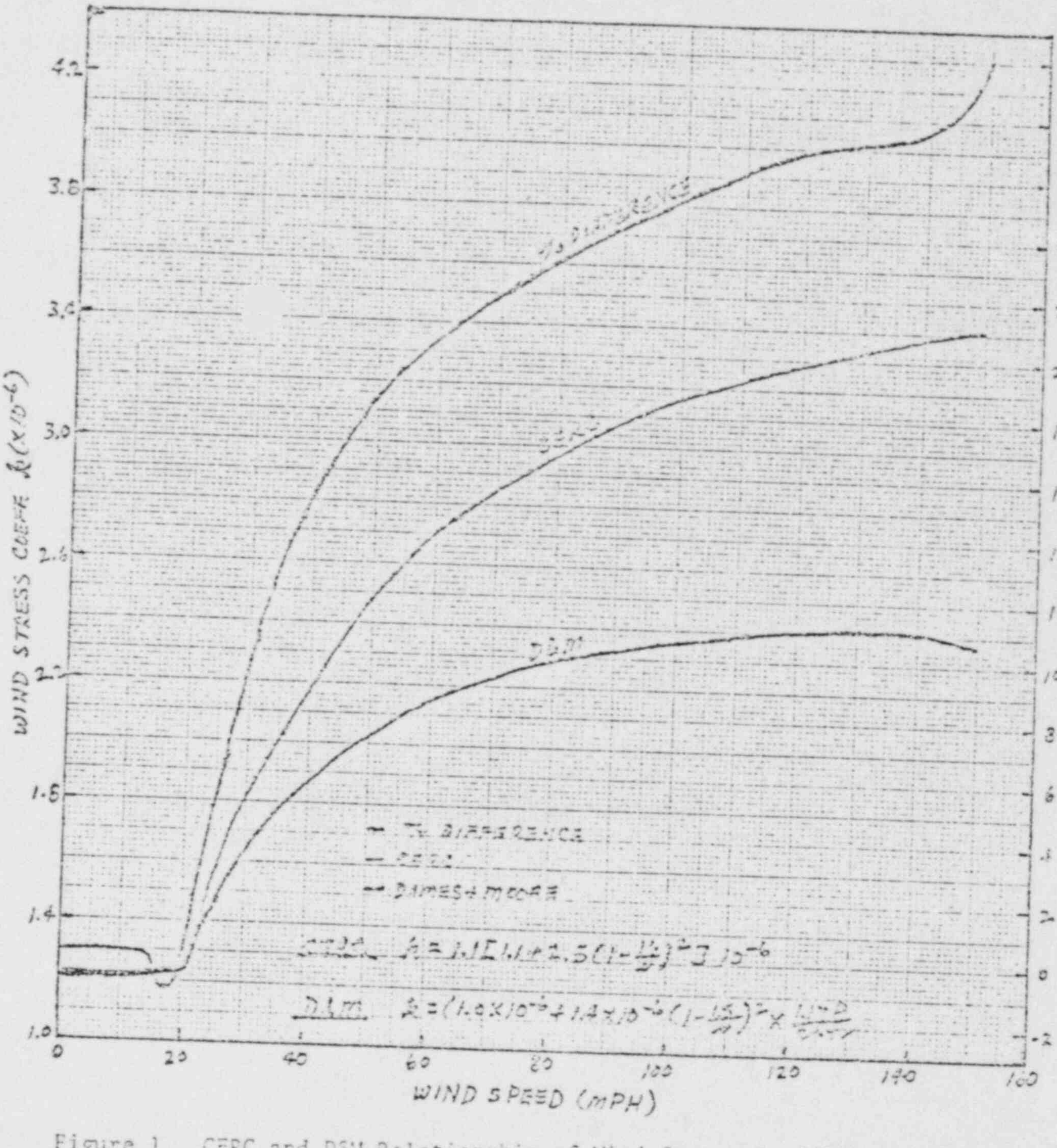

Figure 1. CERC and D&M Relationship of Wind Stress Coefficients to Wind Speeds along the Prime Vector of a Probable Maximum Hurricane (PMH).

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