VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

November 28, 1978

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. O. D. Parr, Chief
Light Water Reactors Branch No. 3
Division of Project Management
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Serial No. 645
ES/FBM: yro

Docket Nos. 50-338
50-339
50-404
50-405

Dear Mr. Denton:

Attached is the meteorological data comparison of the old and new meteorological towers located at Vepco's North Anna Nuclear Power Station. This comparison was completed in order to comply with Amendment 48, Section 2.3 paragraph 2.3.3.2.1, of the North Anna FSAR.

Very truly yours,

Sam C. Brown, Jr. for
Vice President-Power Station
Engineering and Construction

Attachment

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NORTH ANNA METEOROLOGICAL DATA COMPARISON
OLD TOWER (ORIGINAL) VS. NEW TOWER

Virginia Electric and Power Company has completed a study at the North Anna Nuclear Power Station comparing meteorological data from the old tower site with data from the new tower site. Due to the construction of a parking lot in the area surrounding the old tower, it was necessary to relocate the entire tower system. A new tower with all new meteorological instrumentation was installed approximately 1000 feet due east of the old tower (see Attachment 1). Distances and bearings to significant ground features are shown on Attachment 2. This comparison was completed to fulfill the obligation and intent expressed in Amendment 48, Section 2.3, paragraph 2.3.3.2.1 of the North Anna FSAR. We find the meteorological data collected from the new tower site to be completely representative of the data collected at the old tower site, and duplicates the dispersion characteristics of the North Anna Nuclear Power Station as were originally characterized using old tower data. Furthermore, the main dispersion parameters, wind flow and wind persistence, are practically identical.

The new tower system became operational effective April 1, 1977, about 5 months later than the predicted operation date. The 9 months of operation in 1977 was chosen to be representative of the concurrent year data from the new tower system. Unfortunately, its concurrent year counterpart, the old tower system, had numerous outages and equipment failures in 1977. This should have been anticipated, considering the age of the instrumentation and logistics problems in keeping two separate meteorological systems in full operation at one time. It was felt that keeping the new more accurate meteorological system fully operational should receive higher maintenance priority than the outdated equipment of the existing tower. We felt instrumentation replacement should not be necessary, since the sensitivity and accuracy of the newer instrumentation would result in a collection of data not completely representative of the data collected by the older instrumentation of the old system. Furthermore, the existence of a parking lot around the old tower in 1977 would have made a negative impact on any comparisons with the new tower site or any comparisons from previous years data at the same old tower site. The costs of purchasing new instrumentation for only a short usage period were also prohibitive and not necessary as we explain below.

It is felt that even though concurrent years could not be compared as planned, we can show that the new meteorological tower system falls within the expected meteorological variability of the collected parameters as shown in earlier years data collection at the old tower. Old tower data set years 1974, 1975, and 1976 were compared with 1977 new tower data. The meteorological variables of significance which were compared were annual wind roses, wind persistence, stability class frequency, wind speed frequency, diurnal curves of temperature, dew point spread, and delta T. A comparison of these primary meteorological variables with their overriding importance to site dispersion characteristics should be sufficient to show the common diffusion characteristics of both tower locations. The following shows startup dates for both old and new tower systems.

April 1, 1974 - old tower became operational
(no Jan-March data)

April 1, 1977 - new tower became operational
(no Jan-March data)

The following are discussions of each primary meteorological variable.

WIND ROSES

The frequency distribution by direction sector for old tower 1974, 1975, and 1976, and new tower 1977 are given in Attachment 3. The distributions for all 4 years are very similar. The highest frequencies occurred in the S-SSW and WNW-N sectors. Lowest frequencies occurred in the NNE-ESE sectors. The variability among years is as expected with no perceptible differences between old and new tower years.

WIND DIRECTION PERSISTENCE

Wind direction persistence data for old tower 1974, 1975, and 1976, and new tower 1977 are given in Attachments 4 and 5. Attachment 4 is a graph of the cumulative probability of wind persistence occurrence for the four years of data. Attachment 5 gives a more specific interpretation of the curves in Attachment 4 and the maximum persistence in each year. Data for all four years are extremely close on a comparative basis.

STABILITY CLASS FREQUENCY

The frequency of occurrence of each stability class A-G determined by delta T measurements is shown in Attachment 6 for the four comparison years. Data years 1977, 1976, and 1975 show consistent frequency relationships for the seven stability classes. 1974 data does not seem to fit the data of the other years, especially its abnormally high frequency of occurrence in the A stability category. Attachment 11 which will be detailed later, does show consistently more negative values for delta T for the year 1974. The higher occurrences of negative delta T may be partially explained by the diurnal temperature curves of Attachment 8. 1974 has higher temperature values than any of the other years. The difference in temperature is not as great as indicated though due to missing Jan-March data. It is very probable that the high A class frequency is due to a combination of natural delta T variation and some biasing in our data base due to the missing data.

WIND SPEED FREQUENCY

In Attachment 7, wind speed frequency by class is given for the four years of data. The four years of data is markedly similar on a class by class comparative basis. The 4-7 mph class is consistently the class of highest frequency, which further illustrates the four years data compatability.

AMBIENT TEMPERATURE

Attachment 8 shows the diurnal curves of ambient temperature for the four years of data comparison. As indicated previously, the months Jan.-March are missing in the 1974 and 1977 data sets. Therefore, the higher curves for 1974 and 1977 data are biased upward due to the missing data. Otherwise the diurnal curve shape and magnitude among years is very similar, with slight variations as expected due to yearly temperature differences.

DEW POINT TEMPERATURE

Attachment 9 shows the diurnal curves of dew point temperature for the four years of data comparison. As with ambient temperature, dew point curves of 1974 and 1977 are artifically high due to the missing Jan.-March data. The magnitude variation between 1975 and 1976 data is quickly apparent. Year to year variability is the reason for this. Yet even with the magnitude variations, the curve shapes are similar, with 1977 data being equally representative of the other years.

DEW POINT TEMPERATURE SPREAD

Attachment 10 shows the diurnal curves of dew point temperature spread for the four comparison years. Its depiction is unaffected by the missing data problems of the temperature and dew point curves given earlier. The four curves are similar in shape and magnitude thus further depicting excellent temperature agreement between old and new tower sites.

DELTA T

Attachment 11 shows the diurnal curves of delta T for the four comparison years. Curve shapes are extremely similar. The magnitude variations though small are significant because the magnitude of delta T is very critical in the determination of the stability class frequency as earlier depicted. 1974 data is more negative than the other curves indicating a higher A class stability frequency. The magnitude differences though do not vary from what may be expected in year to year variability and the biasing by missing data as earlier explained.

SUMMARY

The data comparisons made in the previous discussions showed that old tower meteorological years 1974, 1975, and 1976 and new tower meteorological year 1977 are extremely compatible with any differences explainable through normal year variability. Every meteorological variable examined showed consistency in the yearly data sets. We are confident that the dispersion parameters taken from meteorological measurements at the new tower site duplicate the dispersion parameters that the old meteorological system produced at a time before conflicting factors made accurate data collection impossible.

Attachment 1

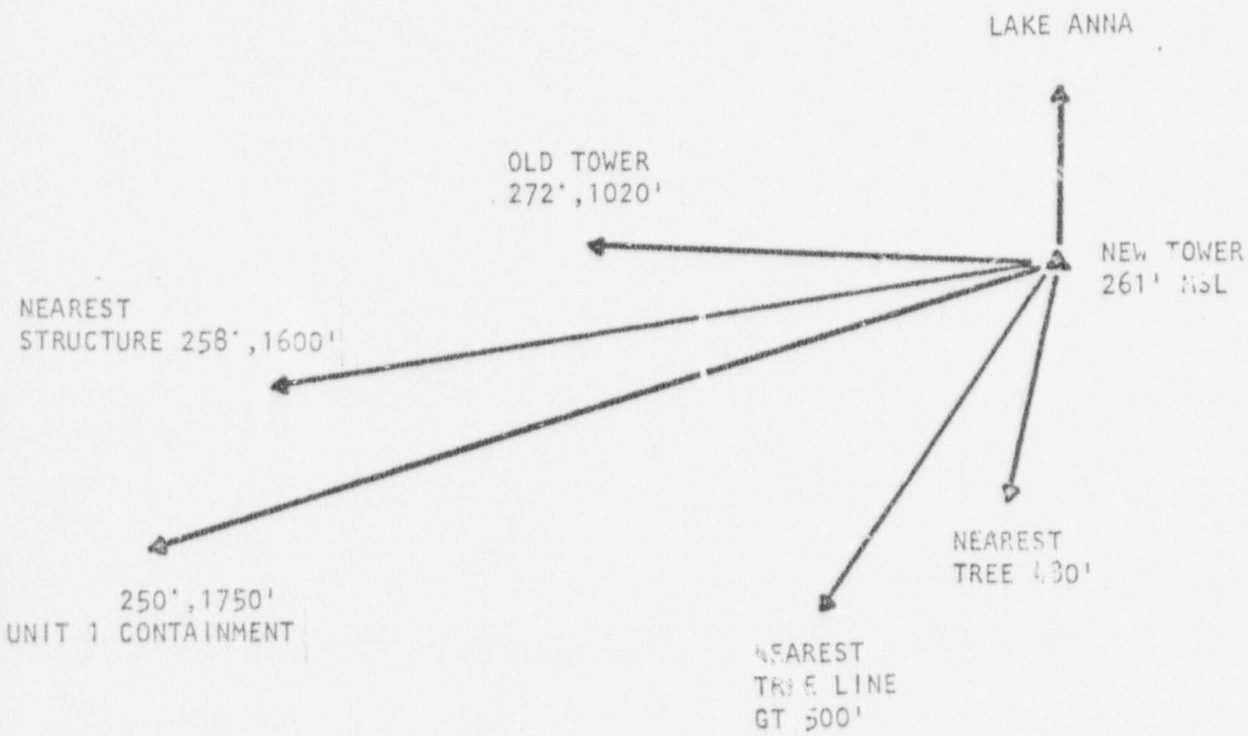
Location of New Meteoro.ogical Tower
North Anna Power Station

Contour Interval 10 Feet

1/2" = 1000 Ft.

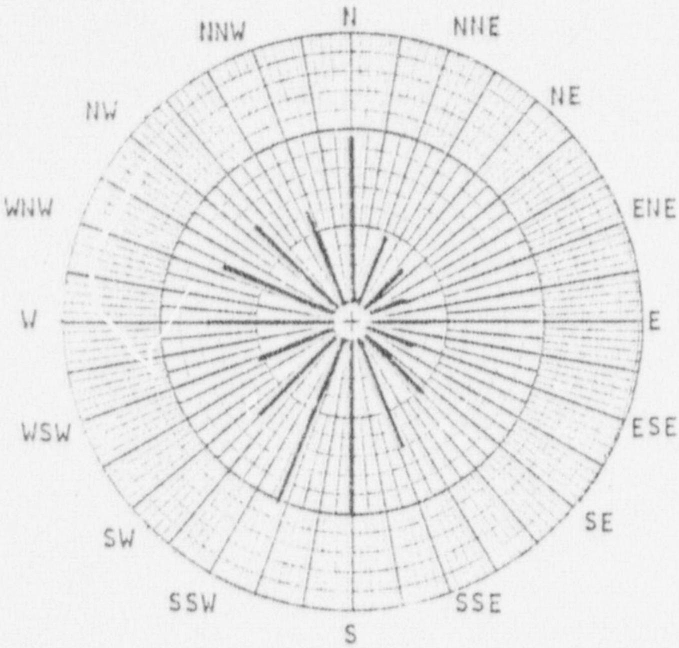
Attachment 2

Proximity of New Meteorological Tower
to Significant Ground Features
North Anna Power Station

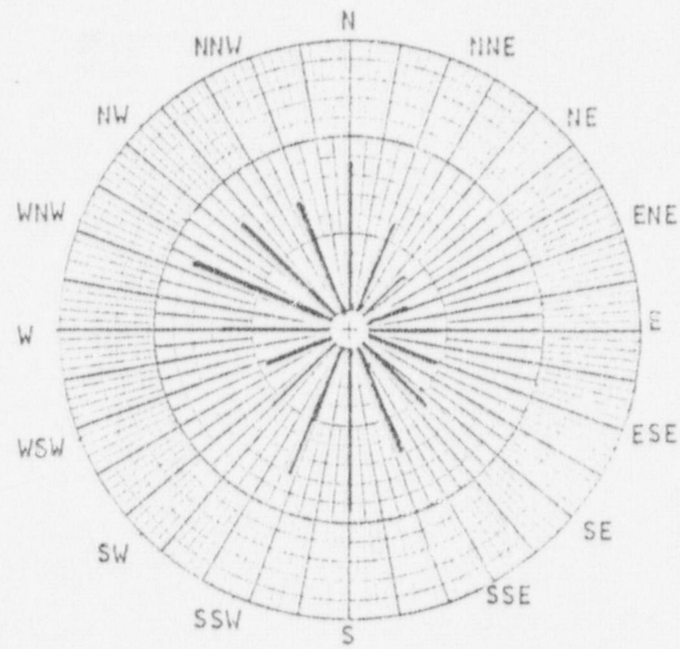


ATTACHMENT 3

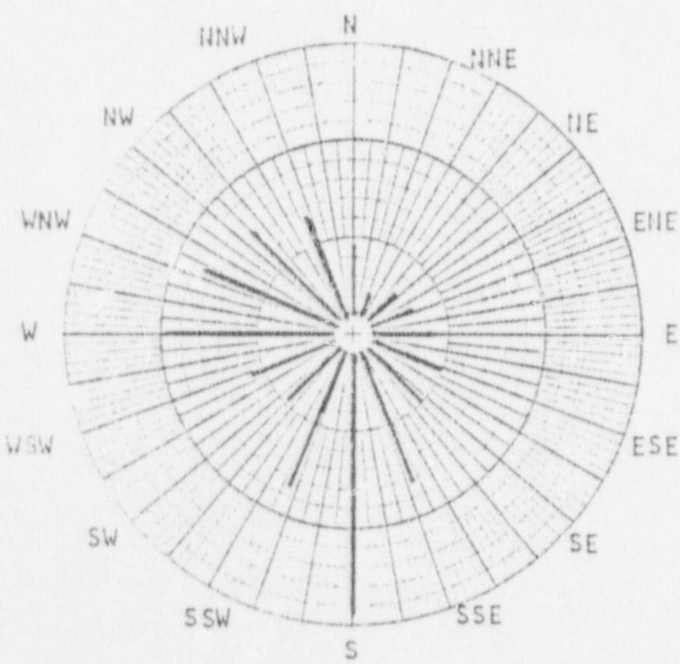
NORTH ANNA 33 FOOT ELEVATION WIND ROSES



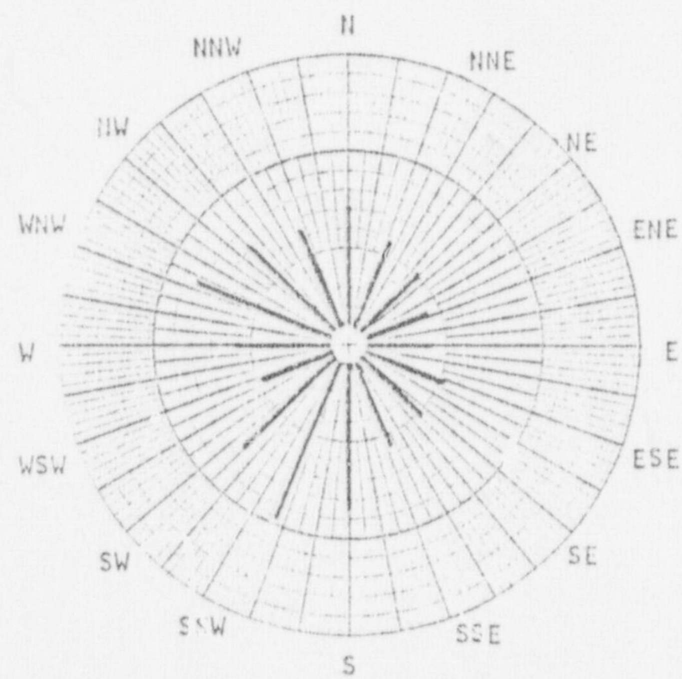
1974
Old Tower



1975
Old Tower

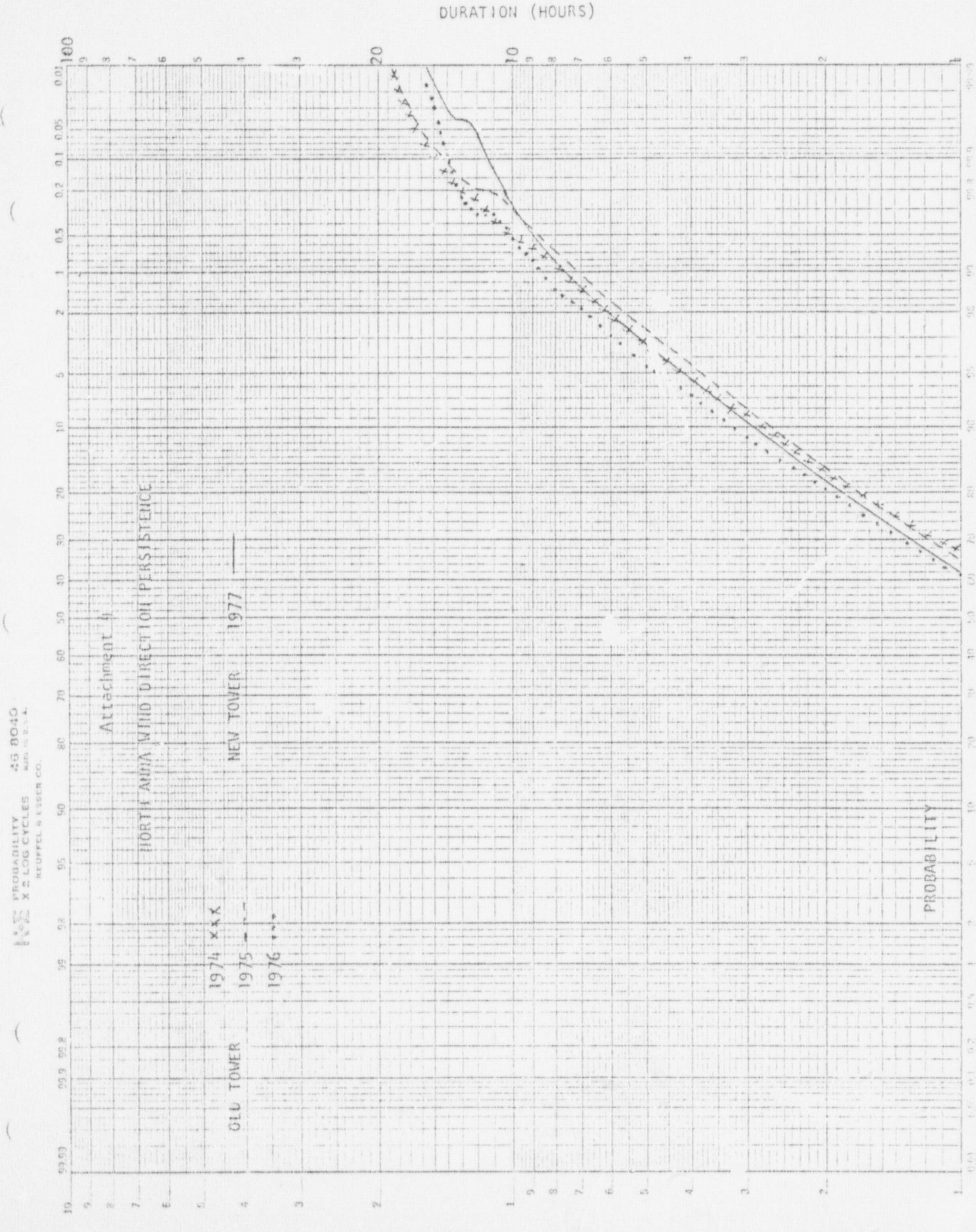


1976
Old Tower



1977
New Tower

*One interval equals 1 percent of frequency



DURATION (HOURS)
Attachment 4
NORTH ANNA WIND DIRECTION PERSISTENCE
NEW TOWER 1977
OLD TOWER
1974
1975
1976
PROBABILITY
PROBABILITY X 2 LOG CYCLES 46 8040
KEUFFEL & ESSER CO.

Attachment 5

WIND DIRECTION PERSISTENCE

PROBABILITY	10%	5%	1%
YEAR	PERIOD GREATER THAN (HRS)		
1977*	2.9	4.1	7.5
1976+	3.2	4.7	8.6
1975+	2.6	3.8	7.1
1974+	2.8	4.2	7.8

*New Tower Data

+Old Tower Data

EXPLANATION: For 1977 the new tower data indicates a 5 percent probab:lity of continuous wind direction persistence periods greater than 4.1 hours.

The maximum 22 1/2 degree range ection persistence episodes recorded from the 33 foot level were:

1977*	1976+	1975+	1974+	
15	15	20	19	(Hours)

Attachment 6

NORTH ANNA STABILITY CLASS FREQUENCY BASED ON DELTA T

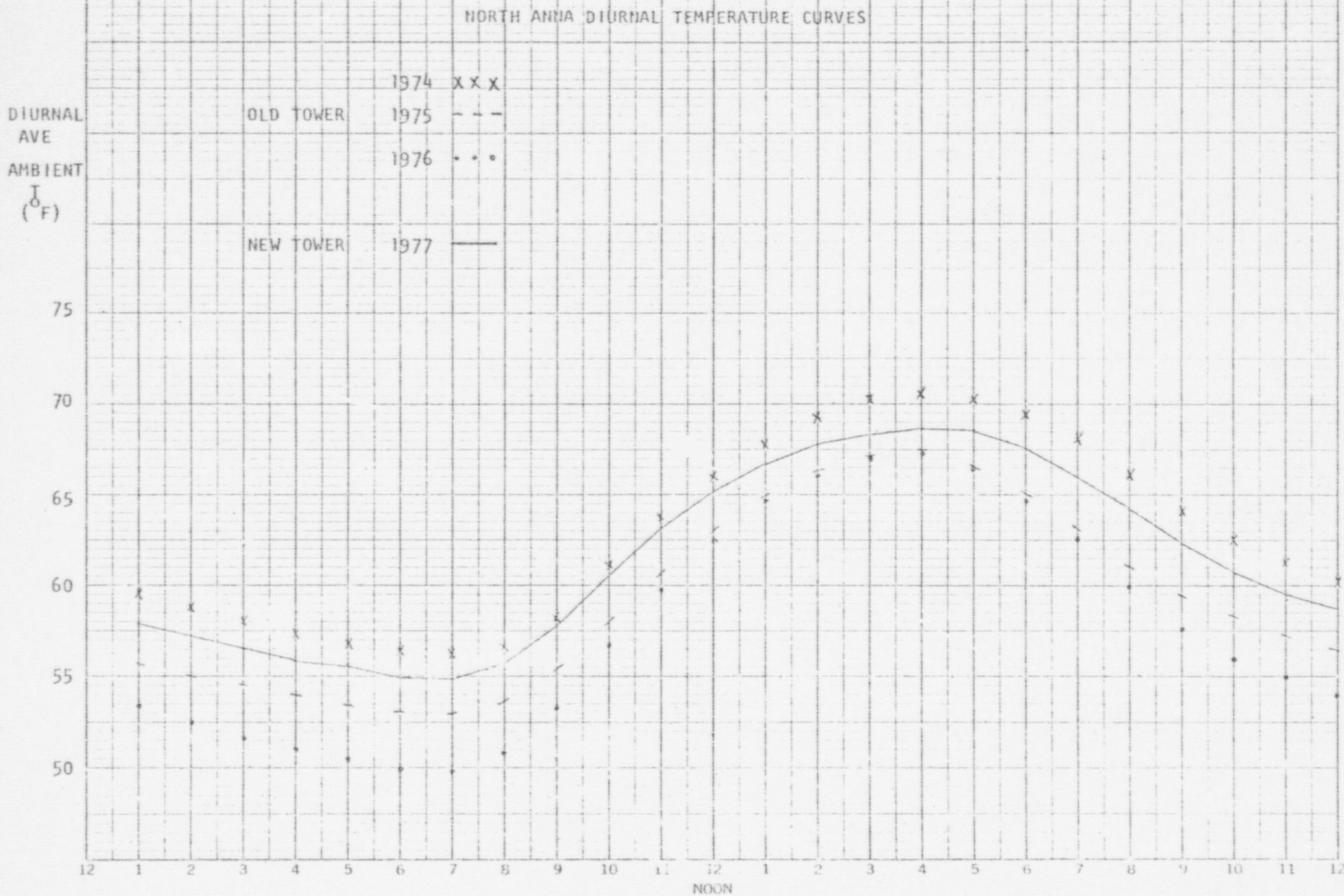
STABILITY CLASS	1974 OLD TOWER % FREQ	1975 OLD TOWER % FREQ	1976 OLD TOWER % FREQ	1977 OLD TOWER % FREQ
A	37.2	10.3	4.8	16.3
B	3.2	2.8	1.9	4.1
C	4.6	3.8	2.2	4.7
D	25.9	35.5	35.7	32.3
E	16.5	33.5	37.3	28.1
F	7.5	9.2	9.6	10.5
G	5.3	4.8	8.5	3.8

Attachment 7

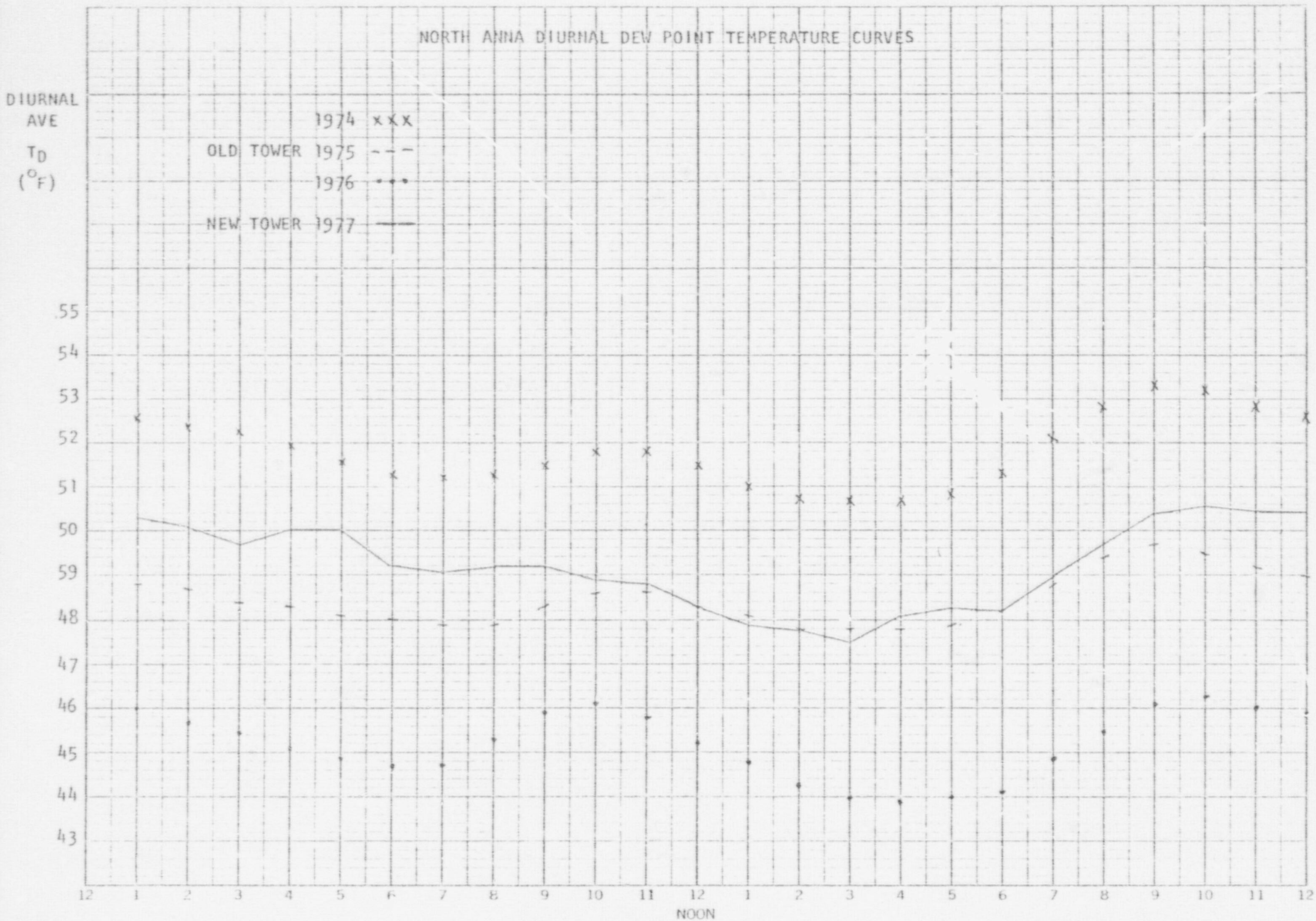
NORTH ANNA 33 FOOT LEVEL WIND SPEED FREQUENCY

WIND SPEED CLASS (MPH)	1974 OLD TOWER % FREQ	1975 OLD TOWER % FREQ	1976 OLD TOWER % FREQ	1977 NEW TOWER % FREQ
Calm	0.8	0.8	0.8	0.7
1-3	27.5	22.4	20.4	26.2
4-7	39.2	42.4	34.8	46.1
8-12	24.9	23.5	26.1	20.9
13-18	6.8	8.1	12.5	5.0
19-24	0.7	2.0	4.4	1.0
> 24	0.1	0.7	1.1	0.1

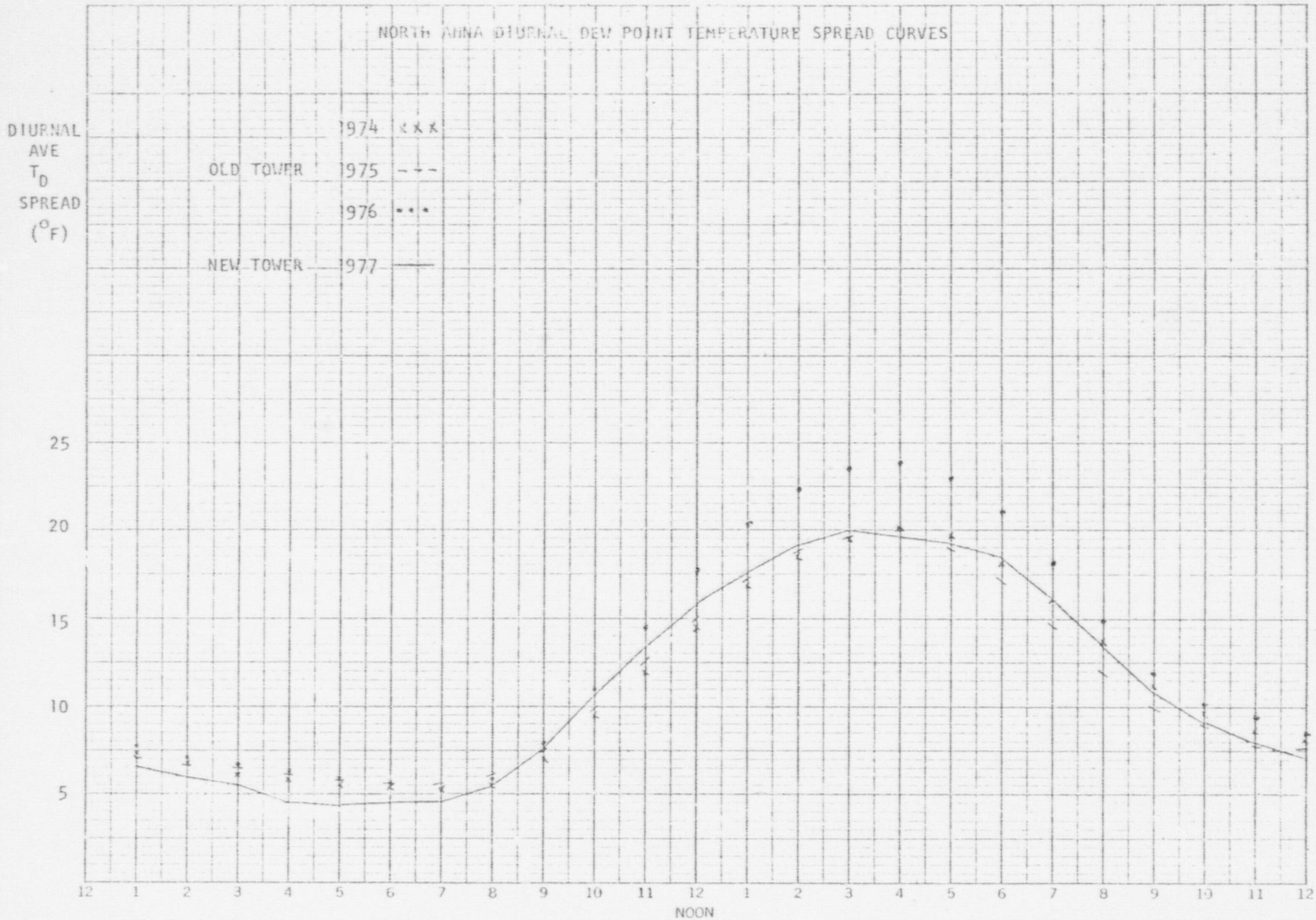
Attachment 8



Attachment 9



Attachment 10



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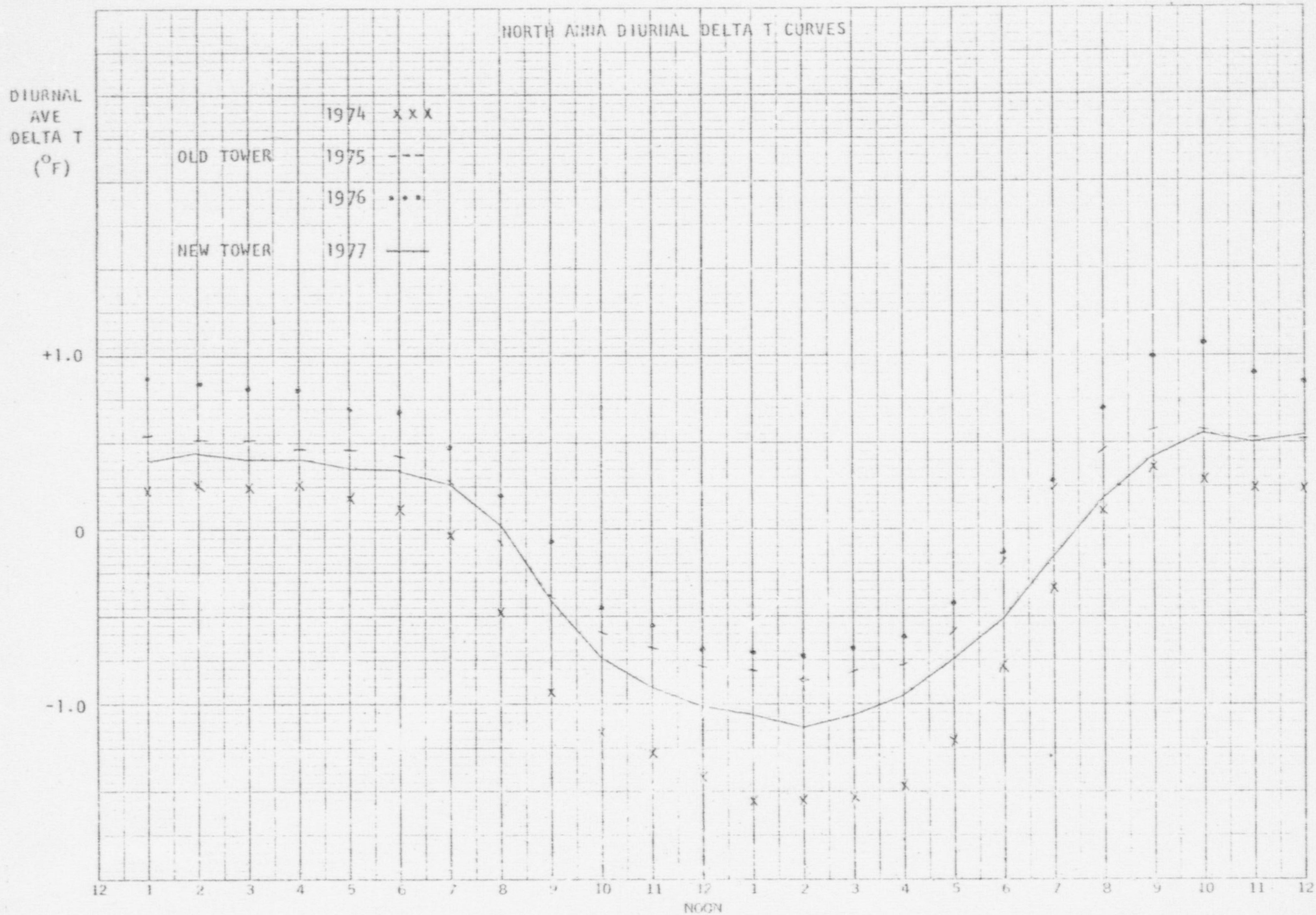
Attachment 11



2.3.3.2 UPGRADED ON-SITE METEOROLOGICAL MEASUREMENTS PROGRAM FOR STATION OPERATION

2.3.3.2.1 General Program Description

The on-site meteorological measurements program, as upgraded, for the North Anna Power Station will consist of monitoring wind direction and wind speed at two levels of a tower, ambient air temperature at the lower tower level, differential air temperature between tower levels, horizontal wind direction fluctuation (σ_θ) at both tower levels, dew point temperature at the lower tower level, and rain fall at the base of the new Met tower (See Fig. 2.3.3.2-1). Total solar and sky radiation will continue to be recorded at the current meteorological monitoring facility until the current meteorological program is terminated as described below.

The current and upgraded meteorological systems will be operated concurrently for not less than one year prior to phasing out the existing system. Solar radiation monitoring will be transferred to the new Met tower facility at that time. The upgraded facility is scheduled to go into operation no later than November 1, 1976.

Data from the current and upgraded systems will be compared at the end of first concurrent year's operation.

2.3.3.2.2 Location, Elevation and Exposure of Instruments

The location for the new meteorological tower is shown on the topographic map, Figure 2.3.3.2-1. Distances and bearings to significant ground features are shown on Figure 2.3.3.2-2. The nearest structures are approximately 1500 feet southwest of the location. The nearest tree is 480 feet south of the location and the nearest contiguous tree line is at a distance greater than 500 feet. Tree heights at the nearest tree line are 40-50 feet.

The new tower and the existing satellite tower will have the same relative proximity to Lake Anna.