**4.5 Hydrogen Chloride (HCl)**

***4.5.1 Method:*** The method used for screening levels of hydrogen chloride (HCl) during the site installations was Dräger tubes. The method is based on a chemical colorimetric indicator. The tubes are filled with a sorbent that is impregnated with a chemical reactant that undergoes a color change in response to a specific compound drawn into the tube with the ambient air. The degree of color change along the length of the tube is indicative of the concentration of the specific compound. Each tube is marked along its length with gradations to indicate the approximate concentration of the compound in the air sample. Measuring range for the tubes is approximately 0.5 to 25 ppm HCl (0.75 to 38 $mg/m^3$).

In addition to the Dräger tubes, a second instrument from Dräger was also employed. This instrument uses the same technology; i.e. tubes with colorimetric indicators, but is instrument-based rather than direct observation. The instrument uses a "chip" of 10 tiny tubes in place of the much larger direct-read tubes and gives a digital read out of the results. The "chips" have a measuring range of 1 to 25 ppm (1.49 to 38 $mg/m^3$). One ppm HCl = 1.49 mg $HCl/m^3$ air.

***4.5.2 Time Frame:*** These samples were take randomly throughout the initial set up of the three sampling sites.

***4.5.3 Agency / Team Size:*** This team consisted of personnel from the NC DAQ who were responsible for the collection of the samples on the screening day.

***4.5.4 Equipment / Supplies:***

Dräger tubes
Hand pump
Dräger instrument
"Chips"
Data sheets for recording "readings"

***4.5.5 Sampling Procedure:*** Intermittently during the initial sampling site installation, members of the teams took tubes and chips samples. The tubes were opened and used according to the directions provided with the HCl tubes and instrument instructions (Appendix XX). The values were read either directly from the tube or the instrument and recorded on the data sheet. The total number of samples taken was 13.

***4.5.6 Sample Analysis and Data Reduction:*** The data sheets were collected and the data was correlated to the wind direction as recorded by the met station at each site at the time of the sample collection. Again, as with the formaldehyde monitoring, the meteorological data from site MC1 will be used to correlate data at MC2 to a wind direction and speed. Table 4.5.1 shows the data collected for the 13 samples and the correlating wind direction at the time the sample was taken.

Drager tubes and chips were employed as an initial monitoring technique to conduct an "evaluation" survey of the area's ambient air to get a more definitive picture of the magnitude of a potential problem before going to more cumbersome and difficult monitoring techniques.

Figures 4.5.1 thru 4.5.3 depict the average wind speed and direction for the 15-minute period during which the samples were collected. At site MC1 the wind direction during sampling was from the west, southwest and south and there were no detectable levels of HCl observed. At site MC 2, the wind direction during sampling was from west, southwest, and south and again no detectable levels of HCl were observed. At site MC 3, the wind direction was from the south-southwest and no detectable levels of HCl were observed.

The NC Division of Air Quality (NC DAQ) has an "action level" for hydrogen chloride of 0.70 $mg/m^3$ (0.47ppm) over a 1-hr exposure period. This value (0.70 $mg/m^3$) is slightly less than the lower end of the Drager tube's operational range (0.75-14.9 $mg/m^3$). Thus if a reaction was observed in the Dräger tube over the short term "grab sample", it would indicate the need for additional investigation. As seen in Table 4.5.1, all of the values were non-detectable for HCl. This indicates that there probably was not an exceedance of the "action level" during the sampling periods. As a point of reference, the ambient air concentration of HCl ranges between non-detect and 0.004 $mg/m^3$ [4].

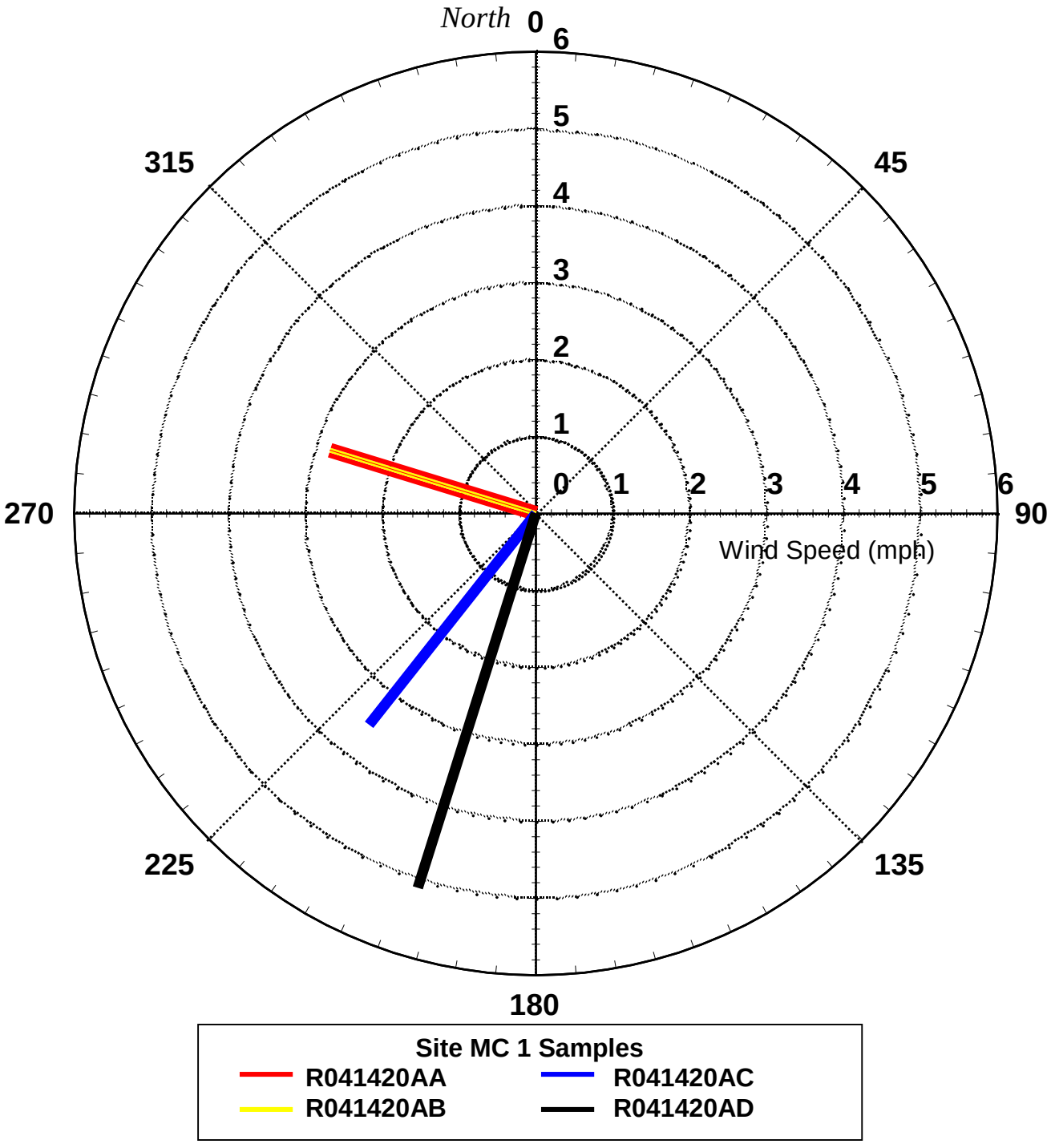
**Table 4.5.1 HCl concentrations at various sites**

| Date | Time | Site # | Sampler # | Type | Wind Direction | Wind Speed | Concentration |
|---|---|---|---|---|---|---|---|
| | (24 hr) | | | | (degrees)[1,2] | (mph)[1,2] | ($mg/m^3$)[3] |
| 4/14/1999 | 15:10 | MC1 | R041420AA | Tube | 287.1 | 2.8 | ND |
| 4/14/1999 | 15:20 | MC1 | R041420AB | Chip | 287.1 | 2.8 | <1.49 |
| 4/14/1999 | 16:20 | MC1 | R041420AC | Tube | 218.3 | 3.5 | ND |
| 4/14/1999 | 16:25 | MC1 | R041420AD | Chip | 197.5 | 5.1 | <1.49 |
| 4/14/1999 | 13:00 | MC2 | R041416BA | Tube | 175.3 | 3.0 | ND |
| 4/14/1999 | 13:10 | MC2 | R041416BB | Tube | 274.0 | 2.3 | ND |
| 4/14/1999 | 13:20 | MC2 | R041416BC | Chip | 274.0 | 2.3 | <1.49 |
| 4/14/1999 | 14:10 | MC2 | R041416BD | Tube | 228.2 | 3.4 | ND |
| 4/14/1999 | 14:15 | MC2 | R041416BE | Chip | 228.2 | 3.4 | <1.49 |
| 4/14/1999 | 16:45 | MC3 | R041420BA | Tube | 206.1 | 2.9 | ND |
| 4/14/1999 | 16:50 | MC3 | R041420BB | Chip | 206.1 | 2.9 | <1.49 |
| 4/14/1999 | 17:30 | MC3 | R041420BC | Tube | 203.6 | 2.6 | ND |
| 4/14/1999 | 17:35 | MC3 | R041420BD | Chip | 203.6 | 2.6 | <1.49 |
| | | Operational Range | | Tube | - | - | 0.75 to 38 |
| | | Operational Range | | Chip | - | - | 1.49 to 38 |
| | | "Action Level" | | - | - | - | 0.75 |

1. These meteorological data points were taken at 15-minute intervals. Therefore samples taken within a given 15-minute period represent the same meteorological period.
2. The meteorological data for Site MC2 was obtained from Site MC1 due to loss of data at Site MC2.
3. There was no color change indicative of the presence of hydrogen chloride, (ND = No Detect)

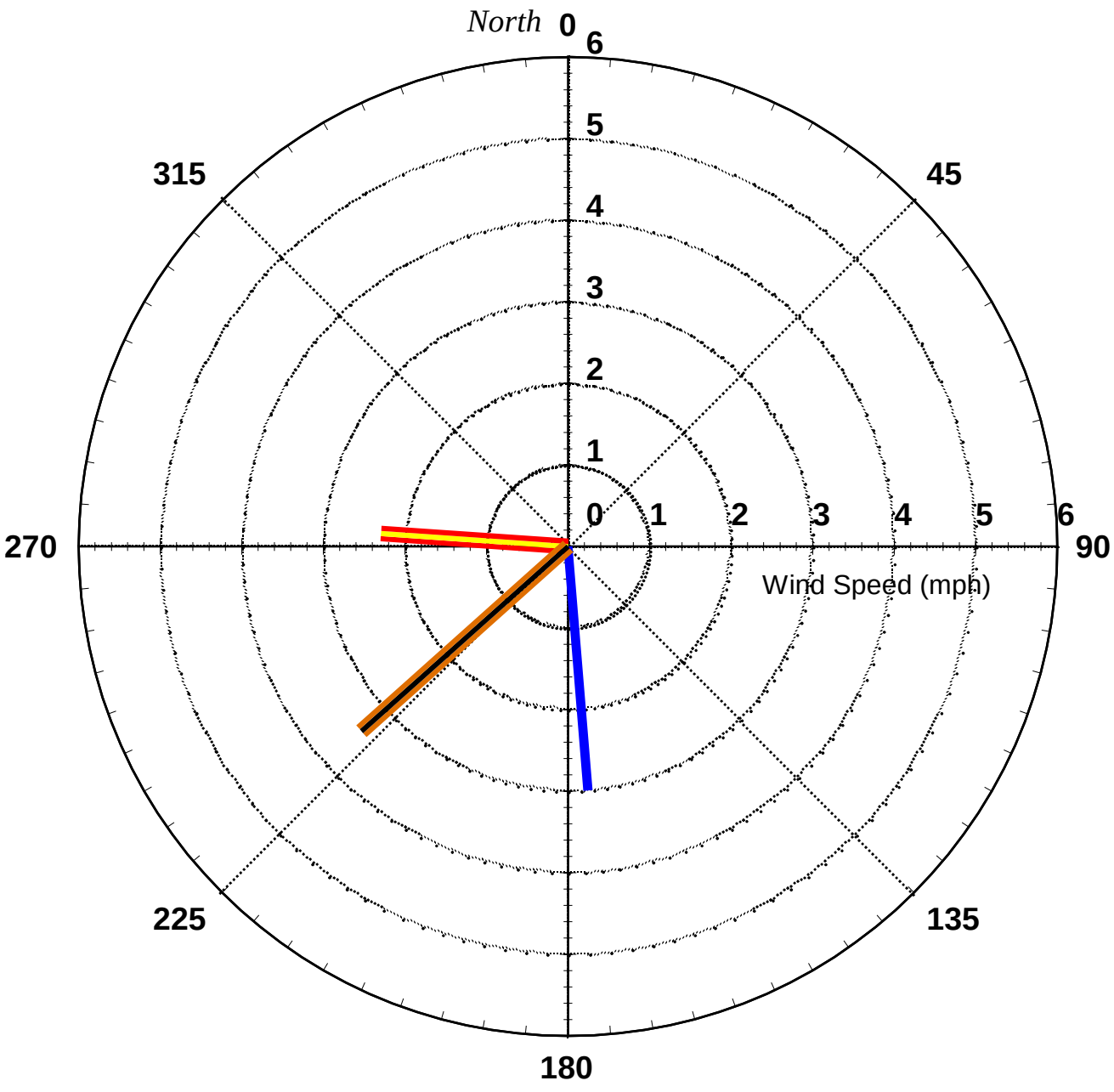
# Figure 4.5.1 - Matthews Survey

Hydrogen Chloride Grab Samples
Meteorological Data during Sampling
Site MC1 - April 14, 1999



# Figure 4.5.2 - Matthews Survey

Hydrogen Chloride Grab Samples
Meteorological Data during Sampling
Site MC2 - April 14, 1999



# Figure 4.5.3 - Matthews Survey

Hydrogen Chloride Grab Samples
Meteorological Data during Sampling
Site MC3 - April 14, 1999