SPECIAL DISTRICTS INSURANCE SERVICES

Voluntary Risk Management Consultation

Date of Visit: February 27 – March 3, 2017
District: Hillsboro School District
Person Conducting Visit: Troy DeYoung
Contact: Michelle Brady

Summary

Between February 27 and March 3, 2017 an indoor air quality (IAQ) assessment was conducted at Hillsboro School District. The assessment was completed at Mooberry Elementary School. The District has historically used their workers compensation carrier to assist with performing IAQ assessments. It is the goal of the District to conduct assessments of ten facilities annually as a preventative measure to ensure the schools IAQ is within acceptable limits.

The assessment revealed there were no immediate concerns that conditions would be unsafe for employees.

Sample Environment

Mooberry Elementary School provides educational space for kindergarten through sixth grade. Data logging sampling was conducted of four classrooms (102, 109, 114 and 120) during the assessment. The classrooms that were sampled were representative of different HVAC zones as well as of the typical classroom environment with a typical occupancy load.

Attached are graphs reports from the data that was collected with the IAQ monitor

Sampling Methodology

Carbon Dioxide, Carbon Monoxide, Temperature and Relative Humidity

A Gray Wolf Direct Sense IAQ monitor was used to evaluate carbon dioxide, carbon monoxide, temperature and relative humidity. These parameters are used to evaluate the overall air quality and comfort levels of the indoor air. The monitor was used for data logging sampling over a 24 hour period in each classroom taking readings once every minute. This unit is owned by Hillsboro School District and is calibrated annually by an outside agency. The monitor was placed and moved from classroom to classroom by Hillsboro School District staff and was within the calibration period at the time of the sampling.

Results

Carbon Dioxide

Carbon dioxide concentrations ranged from low-400 ppm during unoccupied periods and up to around 1,725 ppm during occupied periods. The American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) recommend maintaining indoor carbon dioxide concentrations below 1000 ppm for classroom environments and below 800 ppm for office environments. It is important to remember that carbon dioxide is not a toxin but is a constituent in exhaled breath, and is used as an indicator in determining whether or not adequate amounts of outside make-up air are entering an area. In a building with insufficient make-up air, carbon dioxide levels can build up without adequate dilution. Symptoms in buildings with high carbon dioxide levels involve sleepiness, headaches, excessive fatigue, and eye irritation. The sampling results indicate that all four classrooms had periods of time where they were over 1,000 ppm. This indicates that adequate amounts of fresh air are not being provided by the ventilation system.

The District should have the HVAC system adjusted to have the dampers opened further to allow additional fresh air into the classrooms. The levels found in these classrooms are not dangerous to occupants but may provide for an uncomfortable environment.

Carbon Monoxide

Trace amounts of Carbon Monoxide were detected during the assessment. These levels are in line with expected levels with any building that has parking lots or is near roadways. Symptoms of mild poisoning include headaches and dizziness at concentrations less than 100 ppm. OR-OSHA permissible exposure limit (PEL) is 50 ppm. Carbon monoxide is produced from the partial combustion of carbon-containing compounds, notably in internal-combustion engines. Carbon monoxide is a significantly toxic gas and has no odor or color. It is the most common type of fatal poisoning in many countries. Exposures can lead to significant toxicity of the central nervous system and heart.

Temperature

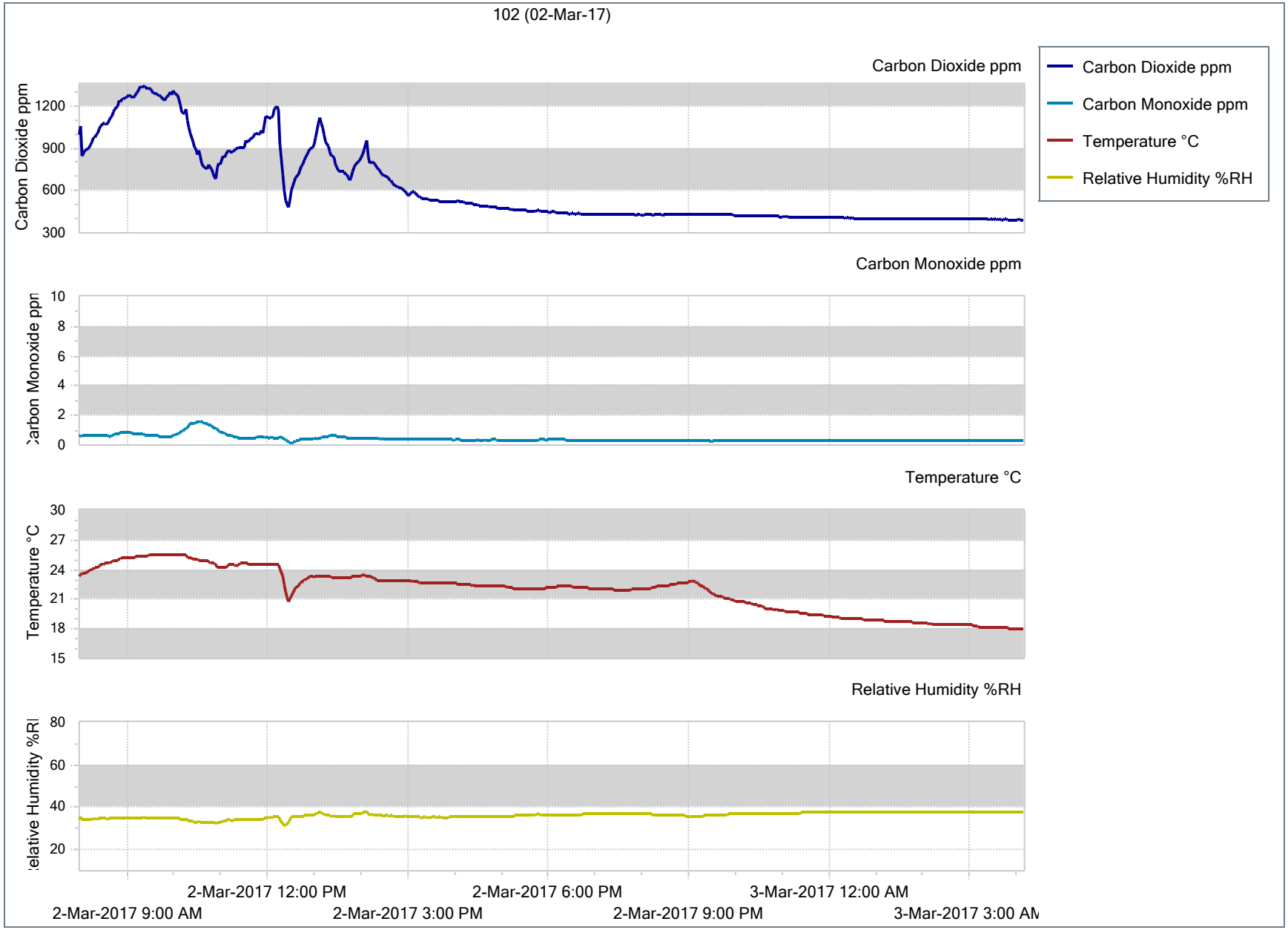
The temperature of the building during occupied periods appeared to be within acceptable ranges, to provide a comfortable working environment. OSHA technical manuals recommend temperature for a comfortable indoor work environment range between 68°F and 76°F.

Relative Humidity and Moisture

The relative humidity of the building ranged from the low 30% range to the low 40% range. OSHA technical manuals recommend maintaining the relative humidity between 20% and 60% to help maintain a comfortable indoor air quality environment and below 70% to prevent mold growth. Molds can be found almost anywhere; the can grow on virtually any substance, providing moisture is present. Molds can grow within wood, paper, carpet and foods. When excessive moisture accumulates in buildings or on building materials, mold growth will often occur, particularly if the moisture problem remains undiscovered or unaddressed. There is no practical way to eliminate all molds and mold spores in the indoor environment. The key to control indoor mold growth is to control moisture. If mold is discovered, clean it up immediately and remove excess water or moisture.

Conclusions/Recommendations

- As a result of the assessment the IAQ should provide for a safe work environment.
- All four classrooms had readings of carbon dioxide over 1,000 ppm for periods of time. These levels are not unsafe for occupants but may provide for an uncomfortable environment. It is recommended that the District inspect the schools HVAC systems and open the dampers further to allow more fresh air into the classroom.


102 (02-Mar-17)
Carbon Dioxide ppm
Carbon Monoxide ppm
Temperature °C
Relative Humidity %RH
Carbon Dioxide ppm
1200
900
600
300
Carbon Monoxide ppm
10
8
6
4
2
0
Temperature °C
30
27
24
21
18
15
Relative Humidity %RH
80
60
40
20
2-Mar-2017 9:00 AM
2-Mar-2017 12:00 PM
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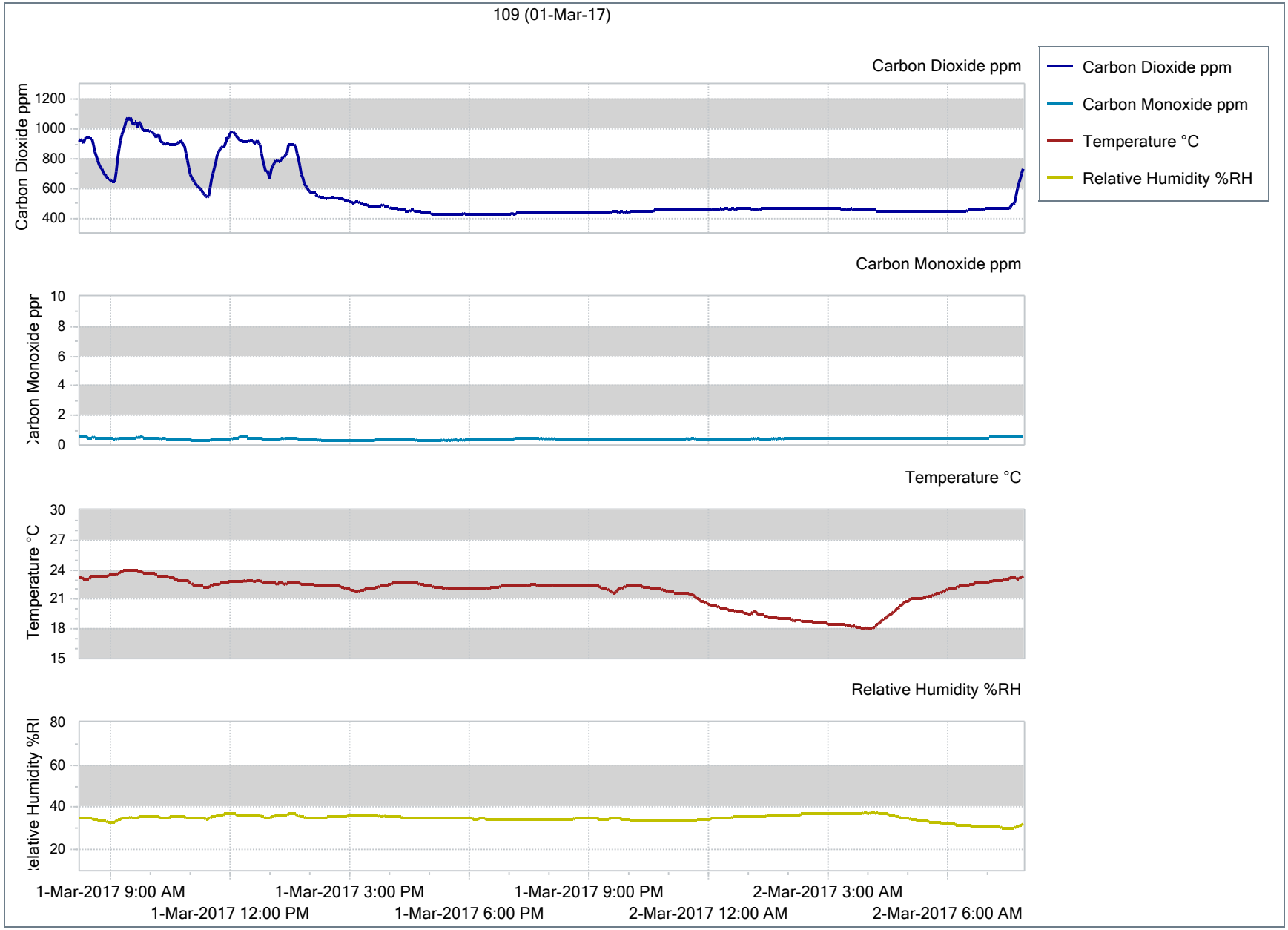
3-Mar-2017 3:00 AM


109 (01-Mar-17)
Carbon Dioxide ppm
Carbon Monoxide ppm
Temperature °C
Relative Humidity %RH
Carbon Dioxide ppm
1200
1000
800
600
400
Carbon Monoxide ppm
10
8
6
4
2
0
Temperature °C
30
27
24
21
18
15
Relative Humidity %RH
80
60
40
20
1-Mar-2017 9:00 AM
1-Mar-2017 12:00 PM
1-Mar-2017 3:00 PM
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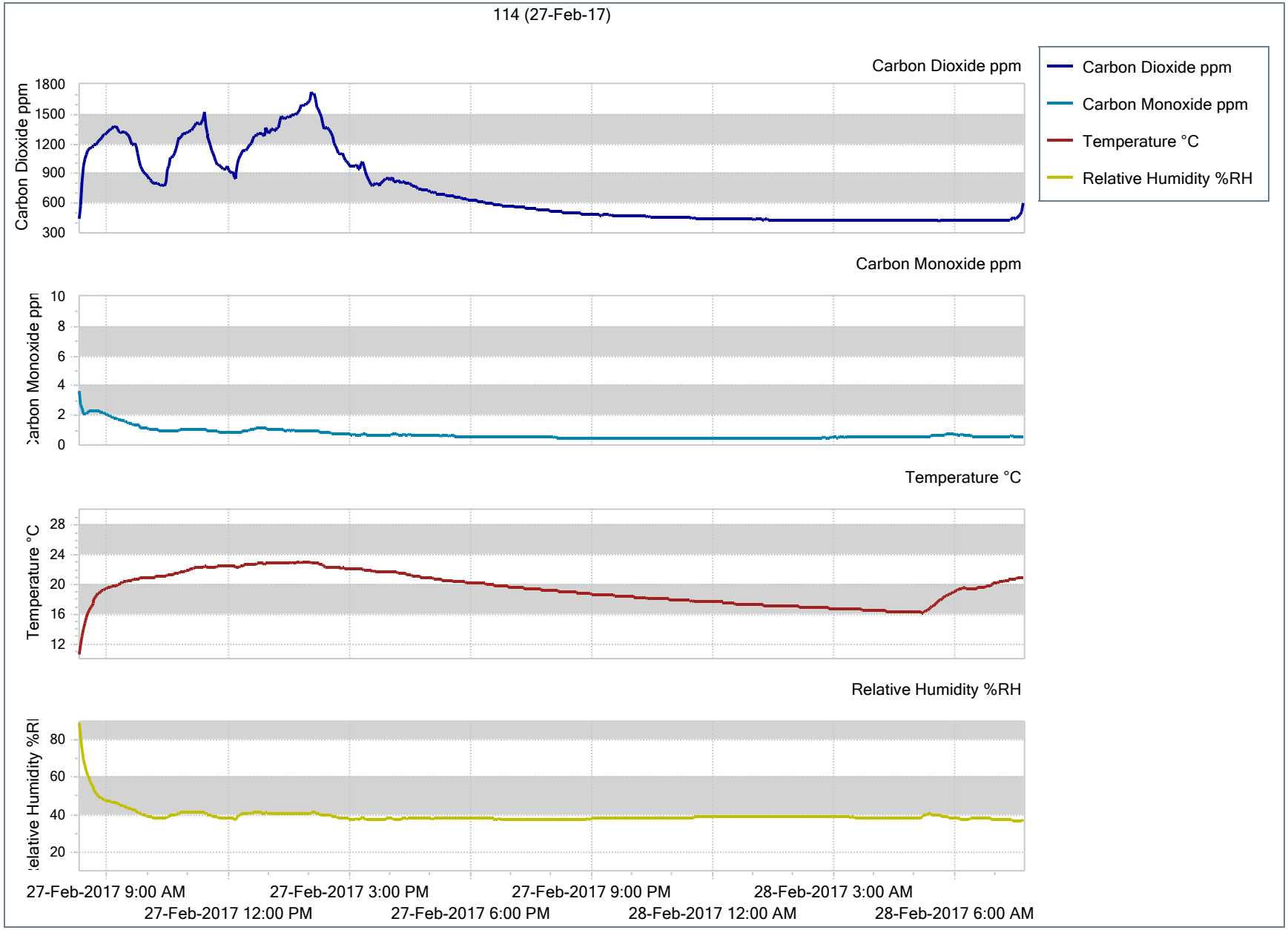
2-Mar-2017 6:00 AM


114 (27-Feb-17)
Carbon Dioxide ppm
Carbon Monoxide ppm
Temperature °C
Relative Humidity %RH
Carbon Dioxide ppm
1800
1500
1200
900
600
300
Carbon Monoxide ppm
10
8
6
4
2
0
Temperature °C
28
24
20
16
12
Relative Humidity %RH
80
60
40
20
27-Feb-2017 9:00 AM
27-Feb-2017 12:00 PM
27-Feb-2017 3:00 PM
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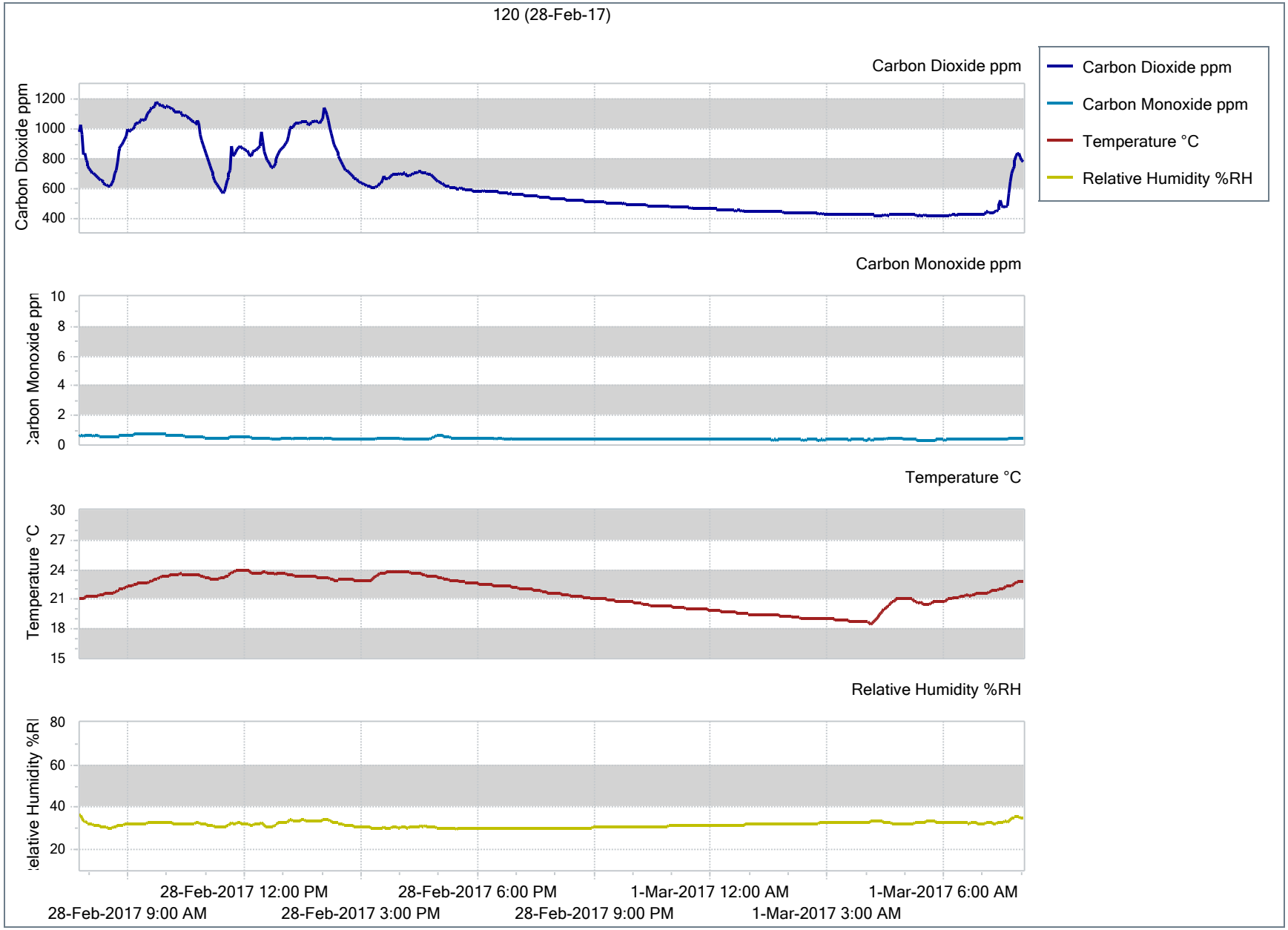
28-Feb-2017 6:00 AM


120 (28-Feb-17)
Carbon Dioxide ppm
Carbon Monoxide ppm
Temperature °C
Relative Humidity %RH
Carbon Dioxide ppm
1200
1000
800
600
400
Carbon Monoxide ppm
10
8
6
4
2
0
Temperature °C
30
27
24
21
18
15
Relative Humidity %RH
80
60
40
20
28-Feb-2017 9:00 AM
28-Feb-2017 12:00 PM
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1-Mar-2017 3:00 AM
1-Mar-2017 6:00 AM