Green Group: Location

Group Summary:	Roles:	Assignment Summary:
This group will compare the pollution levels for ozone (O_3), carbon monoxide (CO), and particulate matter (PM_{10} and $PM_{2.5}$) at different locations within the city using the 8 hour Air Quality Index reports.	Assign roles. Each person tracks one pollutant. 1. Ozone Tracker 2. Carbon Monoxide Tracker 3. Particulate Tracker If there are more than 3 people in this group, then there will be several ozone and carbon monoxide trackers (divide the locations to track)	Each student will enter the data into a spreadsheet for his/her pollutant for each location where it is monitored.

COLLECT DATA: Set-up (1st time)

1. Decide on each of your roles (see above).

2. Go to the activity website (http://www.airinfonow.com/html/airexercise/materials.html) and download the Excel spreadsheet for the "Green Group: Location."

3. Save the spreadsheet onto your disk or computer.

Green Group Instructions, pg. 2

1. Open your saved Excel spreadsheet.

2. Go to the bottom of the spreadsheet and select your pollutant (carbon monoxide, ozone, or particulates). This will open the correct sheet.

3. Go to the activity web site and click on "Get Your Data" in the Green Group: Location Column.

4. Choose the date you need.

Note: In order to get a full day's worth of data, you will need to view the data for the previous week day (i.e. yesterday, or if it is currently a Monday you will view Friday's data).

5. Click on "**view" PSI Report text/html**. You see the locations listed.

6. Enter the date you have chosen into the "Green Group: Location" spreadsheet.

7. Enter the data for your pollutant into the spreadsheet.

8. Repeat until all the data is entered.

9. Be sure to save your worksheet!

Green Group Instructions, pg. 3

PRESENTATION PREP: Find Averages

1. Find the average and standard deviation for each location for your pollutant at the end of each week.

2. You will notice there are some squares with the words "#DIV/0!". These squares already have the formula to find the average of your data. (Note: The average changes as you enter the data.)

3. You will need to enter the formula for the average for the remaining squares. There are several ways to do this – try one of each of the ways:

a. *Go to INSERT Þ FUNCTION Þ select AVERAGE Þ enter the first and last cell numbers you want to average separated by a colon. In the third average box that would be (E3:E7).*

<div align="center">OR</div>

b. *Type =average(E3:E7) then hit enter. You can also highlight/select the cells you want to include.*

<div align="center">OR</div>

c. *Select a cell that already contains an average calculation. Copy the cell and paste the formula into the cell you want. Be sure to double check that the formula includes the correct cells for which you want the average.*

4. You will need to find the Standard Deviation (which tells you how variable your data is or how much change there is between weekdays at the same location). There are several ways to do this – try one of each of the ways:

a. *go to INSERT Þ FUNCTION Þ select STDEV Þ enter the first and last cell numbers you want to average separated by a colon. In the third Standard Deviation box that would be (E3:E7).*

<div align="center">OR</div>

b. *Type =stdev (E3:E7) then hit enter. You can also highlight/select the cells you want to include.*

<div align="center">OR</div>

c. *Select a cell that already contains a Standard Deviation calculation. Copy the cell and paste the formula into the cell you want. Be sure to double check that the formula includes the correct cells you want the Standard Deviation of.*

Green Group Instructions, pg. 4

PRESENTATION PREP: Graphing

1. Each student will plot the averages on a graph (pollutant vs. location)

2. In your spreadsheet, highlight the averages for each location. If you are plotting multiple week averages, hold down the "Control" button and click on the squares you want to graph.

3. Click on the bar graph icon OR go to the "Insert" menu and select "Chart."

4. Select "Column" for chart type then select "Next."

5. Leave the data range alone and select "Series In: Rows."

6. Now click on the "Series" tab (top of gray box).

7. Click in the box "Category (X) axis labels" and then highlight your locations. (You should see the X axis labels change from 1, 2, 3… to Alvernon & 22nd, Cherry & Glenn, or whatever your locations are.)

8. Select "Next."

9. Enter a "Chart Title" such as "Average Weekly Carbon Monoxide By Location: Dates" (or whatever your pollutant is for whatever time period.

10. Enter a "Category (X) Axis" such as "Location."

11. Enter a "Value (Y) Axis" such as "AQI" the select "Next."

12. Select "Place Chart: As New Sheet" and enter a label such as "CO Graph."

13. Select "Finish." Be sure to save your work!

14. Now we are going to add error bars.

15. Double click on one of the bars. You should see squares show up in the middle of all of the bars.

16. A window titled "Format Data Series" should come up.

17. Click on the tab titled "Y Error Bars."

18. Select "Display Both."

Green Group Instructions, pg. 5

19. Under "Error Amount" select "Custom" and click in the "+" field.

20. Now go back to the spread sheet by clicking on the lower left tab.

21. Highlight the cells standard deviation cells that correspond with the averages you plotted.

22. Go back to the chart. Under "Error Amount" select "Custom" and click in the "-" field.

23. Again, go back to the spread sheet and highlight the same standard deviation cells. You should see the error bars on the columns.

PRESENTATION PREP: Mapping

DO THIS AFTER AT LEAST 1 MONTH'S DATA HAS BEEN COLLECTED.

As a group, plot the average AQI on a map of Tucson using the AQI color code. (AQI color code is found at the bottom of a data page on the website)

1. Draw 3 maps of Tucson on a large sheet of butcher paper (~ 4' x 4') and label "Ozone Map", "Carbon Monoxide Map", and "Particulate Map". Decide ahead of time what your map scale will be (e.g. how many inches = how many miles or kilometers). Be sure to include major intersections and landmarks.

2. Mark the locations of the monitoring stations on your maps.

3. On a scratch sheet of paper decide what your boundary distances will be from each station on the map. These boundaries will be your "best guess" regions where the air quality is similar to that registered at the nearest monitoring station.

4. Using the AQI colors, decide on a color scale to indicate pollutant concentrations.

   For example: The AQI may be "good" and the region would be colored green, but you may want to have light green to represent an average concentration range of 0 to 25, and dark green to represent and AQI range of 25 to 50. You can create a scale for all of the AQI colors (green, yellow, orange, red, purple).

Green Group Instructions, pg. 6

5. On the map, color in the average pollutant concentrations according to the AQI color scale you created.

PRESENTATION PREP: Find Trends

1. As a group, analyze trends in air quality based on location in the city.

Consider the following (Use your graphs and maps to help you):
- Are there certain locations in the city that have higher ozone, carbon monoxide, PM_{10}, or $PM_{2.5}$?
- Do you have any ideas why there may be differences?
- Are these trends consistent over the month, 2 months, 5 months?
- Develop one or more hypothesis to describe the trends. Be careful not to draw conclusions or overstate your data.

PRESENTATION

Present your data, graphs, hypothesis, and/or conclusions to your class.