**Lab 8: Weather and Air Quality**

**Question 1:**

Read through this link to find the current NAAQS “level” for ozone

<https://www.epa.gov/criteria-air-pollutants/naaqs-table>

**Question 2:**

Complete the table on the handout. You only need to complete the grey blocks (not the black ones). Please complete as ppm to the tenth place (one value after the decimal). You do not need to show your work for every problem. I recommend using Excel to comput these numbers easily.

When you tell me the max 8 hour average I want the actual number in **ppm.** To convert ppb (on the table) to ppm, you need to **divide by 1000.**

**Question 3:**

You are using the equation at the bottom of pg 52 and the max ozone value you found to get an exact AQI value to get your answer. You are trying to find the index for pollutant p (I\_p) .

Look at the table on pg 53 or the table I made below and determine with row your value for number 2 fell within. For example, if my value for #2 was 0.05ppm That would fall within 0-0.64ppm ozone breaking points and thus I will use information from row one of the table. Now I solve the equation at the bottom of 52 using the data in row 1 and my value from #2 (known as C\_p). Report this value in the hundredths (two values after the decimal). SHOW YOUR WORK!

This is what it would look like if my answer to #2 was 0.05ppm

$$I\_{p}=\frac{\left(I\_{hi}-I\_{lo}\right)}{BP\_{hi}-BP\_{lo}}\left(C\_{p}-BP\_{lo}\right)+I\_{lo}= \frac{\left(50-0\right)}{0.064 ppm-0ppm}\left(0.05ppm-0ppm\right)+0=39.06$$

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  | **Ozone Breaking points (ppm)** | **AQI (no unit)** |  |
|  | BP\_lo | BP\_Hi | I\_lo | I\_Hi |  |
|  | 0 | 0.064 | 0 | 50 |  |
|  | 0.065 | 0.084 | 51 | 100 |  |
|  | 0.085 | 0.104 | 101 | 150 |  |
|  | 0.105 | 0.124 | 151 | 200 |  |
|  | 0.125 | 0.374 | 201 | 300 |  |
|  |  |  |  |  |  |

**Question 4:**

<http://www.airnow.gov/index.cfm?action=aqibasics.aqi>

What index level of concern does your value from #3 fall under? Who will be impacted?

**Question 5+6:**

This is using the data table on page 52. Plot temperature on the first graph and then use the second graph (page 54) for ozone. You are plotting the HOURLY ozone values, NOT the 8-hour averages you calculated earlier. You must make your own x-axis (3hr increments) and label both y- and x-axes. Plot ALL 24 points on each graph. I know that the y-axis for ozone is not tall enough so just go above the graph and reasonably estimate where your points should be.

**Question 7:**

Do not use the table in the lab manual. It’s not quite right. Use this one. Note that different scales on the y-axes. You should be able to copy and paste the below data into excel to create the two plots. OR you can complete the charts on page 55 by plotting all points.

|  |  |  |
| --- | --- | --- |
| **Year** | **# Days above 90°F** | **# Ozone Exceedances** |
| 1972 | 22 | 58 |
| 1973 | 27 | 84 |
| 1974 | 18 | 79 |
| 1975 | 23 | 86 |
| 1976 | 27 | 0 |
| 1977 | 45 | 108 |
| 1978 | 26 | 78 |
| 1979 | 13 | 52 |
| 1980 | 46 | 93 |
| 1981 | 22 | 61 |
| 1982 | 18 | 72 |
| 1983 | 49 | 83 |
| 1984 | 15 | 62 |
| 1985 | 21 | 87 |
| 1986 | 32 | 73 |
| 1987 | 37 | 80 |
| 1988 | 54 | 73 |
| 1989 | 16 | 51 |
| 1990 | 17 | 58 |
| 1991 | 51 | 86 |
| 1992 | 22 | 45 |
| 1993 | 42 | 86 |
| 1994 | 35 | 63 |
| 1995 | 51 | 70 |
| 1996 | 14 | 51 |
| 1997 | 34 | 56 |
| 1998 | 38 | 75 |
| 1999 | 37 | 68 |
| 2000 | 11 | 37 |
| 2001 | 22 | 51 |
| 2002 | 48 | 67 |
| 2003 | 14 | 29 |
| 2004 | 11 | 32 |
| 2005 | 29 | 44 |
| 2006 | 39 | 37 |
| 2007 | 45 | 55 |
| 2008 | 27 | 31 |
| 2009 | 13 | 11 |
| 2010 | 59 | 44 |
| 2011 | 34 | 29 |
| 2012 | 45 | 30 |
| 2013 | 26 | 9 |
| 2014 | 10 | 5 |
| 2015 | 18 | 8 |

**Question 8:**

High temperatures are not always a good indicator of high ozone. Tell me why this may be. Use your knowledge of how ozone is created and provide a conceptual theory.

**Question 9:**

What leads to hot stagnant air? High or low pressure systems. Circle the pressure systems that lead to hot, stagnan air on the map below.

**Question 10:**

Ohio is west of Maryland. Think about how the wind travles in the midlatitudes. How will the pressure sytem near Maryland impact this?