## Science Lab: Air Quality

Part 1: Estimate Visibility

**Record current conditions:**

1. Record the date and time on your data page.
2. Describe your location on your data page. Note factors that could influence your visibility. Are you on the 12th floor of a building? Are you in a valley, on a sports field surrounded by trees, or on tops of a small hill? Are you at ground level?
3. Look at the horizon. What is the farthest landmark that you can see clearly when you look at the horizon? Record this on your data sheet.
4. Record the sky color on your data sheet.
    a. Dark blue
    b. Bright blue
    c. Light blue
    d. White/milky blue
    e. Brown/yellow
5. Record how clear the air seems to be (visibility)
    a. Extremely clear
    b. Clear
    c. Somewhat hazy
    d. Hazy
    e. Extremely hazy
6. If asked on your data page, record the air temperature.
7. On your data sheet, note weather conditions, especially if they influence or impede your assessment of the sky color. Heavy rain, snow, or fog, for example, obscures the sky.
8. Looking directly overhead, estimate what percentage of the sky is covered with clouds. If you look at the horizon to assess cloud cover, your estimate will be high, since you can't see breaks in the clouds from an angle. Record both the percentage and the cloud cover category as follows:

    <10% Clear
    10–25% Isolated
    25–50% Scattered
    50–90% Broken Overcast
    >90 Overcast

**Calculate visibility with Google Earth:**

1. Open Google Earth.
2. Type the address of your observation site in the “fly to” box on the upper left side of the page and hit enter. Google Earth will zoom into your location.
3. Place the cursor over your observation site. The latitude and longitude of that location will appear in the bar below the Earth. Note the latitude and longitude on your data sheet.

   a. To help you jump to your location for future observation, it will be helpful to put a placemark in this location. To place a placemark, click on the yellow pushpin in the top tool bar or go to the Add menu and select placemark.
   b. Click on the placemark on the map and drag it to your observation location. As you move the pin, the latitude and longitude of the pin's location will be displayed in the placemark pop-up screen. Make sure that the placemark is centered on the latitude and longitude you recorded as your location on the data sheet.
   c. Name the placemark so that you can save and return to the location next time you open Google Earth.
4. Locate the landmark you observed in step 1 on Google Earth. You may type the address or location in the "fly to" field as in step 2 or visually locate the landmark on the Google Earth display.
5. Zoom in or out until both the landmark and your observation point are visible on the screen at the same time.
6. Go to the Tools menu and select ruler. A Ruler tool box will open. Select line.
7. Click on your placemark (observation point).
8. Click on the landmark you observed on the horizon.
9. Google Earth will draw a straight line between the two points and tell you the length of the line. On the data sheet, record the distance between your observation point and the landmark. This will tell you approximately how far you saw that day.

**Relate visibility estimates with actual air quality data:**
Poor air quality contributes to poor visibility, but poor visibility doesn't always mean that the air quality is bad. Fog or clouds may be limiting visibility. "The U.S. EPA, NOAA, NPS, tribal, state, and local agencies developed the AIRNow Web site to provide the public with easy access to national air quality information. The Web site offers daily AQI forecasts as well as real-time AQI conditions for over 300 cities across the US, and provides links to more detailed State and local air quality Web sites."

1. To find out if your measurements of visibility are related to air quality, go to AIRNow (http://AIRNow.gov). From the drop-down menu on the top of the page, select your state and click go.
2. On the data sheet, note the air quality index for both ozone and particles as well as the color code.
3. How do the ozone and particulates readings compare to visibility observations in your area?