United States Environmental Protection Agency

School Flag Program Coordinator Handbook

School Flag Program Coordinator Handbook

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina

Thank you for being a School Flag Program Coordinator. We hope that you find this handbook helpful. We would appreciate any suggestions you may have to improve it. Questions about the School Flag Program should be directed to your local sponsor or to Donna Rogers, at rogers.donna@epa.gov.

Publication No. EPA-456/B-11-001
November 2011

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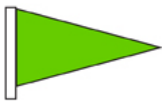
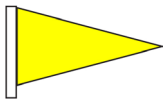
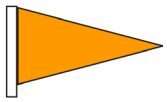
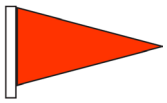
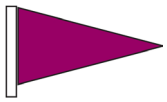
Overview of the School Flag Program

The School Flag Program uses brightly colored flags to help children, parents, school personnel, and the community be aware of daily air quality conditions. Knowing the air quality conditions can help protect individuals both at school and at home. The flag colors correspond to the colors used in EPA's Air Quality Index (AQI), which tells how clean or polluted the air is for that day. When members of the school and the surrounding community know what the daily air quality is, they can adjust their activities to reduce their exposure to air pollution.

Each day, schools raise a colored flag that corresponds to the local air quality forecast:

	Green flag – good air quality
	Yellow flag – moderate air quality
	Orange flag – unhealthy for sensitive groups (including all children and people with asthma)
	Red flag – unhealthy for everyone
	Purple flag – very unhealthy for everyone

Note: There is a sixth color -- maroon -- used in EPA's Air Quality Index. It indicates hazardous air quality. It is not included in the school flag program since it is rare and will trigger health warnings of emergency conditions from local media.

Air quality can become unhealthy due to pollutants such as ground-level ozone and particle pollution. Ozone is especially damaging to the lungs of children and those who work and play outside. Particle pollution - especially fine particles such as those found in smoke, haze or dust - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Children (including teenagers) are at greater risk from air pollution because their lungs are still developing and they breathe more air per pound of body weight than adults. People with asthma are also more likely to have symptoms when pollution is in the air. Children, including those with asthma, can continue to stay active even when air quality is unhealthy by modifying their activities or, in some cases, moving their activities indoors.

This handbook describes the four steps a School Flag Program Coordinator needs to take to implement a successful flag program:

1. Purchase flags
2. Educate and inform the school and the community at the start of the program
3. Find out the daily air quality forecast and fly the corresponding flag
4. Know what actions to take when the air quality is unhealthy

The School Flag Program can be a great way to teach people about their local air quality, how air pollution impacts our health, and what actions we can take to protect ourselves. You'll find more information about the School Flag Program, the AQI, ground-level ozone and particle pollution, and the health effects of air pollution in the Background Information and Resources sections of this handbook.

Steps for a Successful School Flag Program

Step 1: Purchase flags

You can buy a set of flags through a local flag vendor, or you can find vendors online. Sometimes sponsors such as a parent teacher organization, a local environmental organization or a community business may be willing to purchase the flags for your school.

You will need five flags: green, yellow, orange, red, and purple. The purple flag might be needed only on rare occasions, but it is important to have if there is an air quality alert due to a wildfire or other serious air quality episode. There are some suggested color names and PMS (pantone matching system) numbers that your flag vendor may recognize. If you cannot get these exact colors, any similar green, yellow, orange, red, and purple will do. The colors are called Irish Green (3415 or 349), FM Yellow (108 or 102), International Orange (165), Canada Red (186 or 485), and Lilac (2655 or 2665). Some schools have found it useful to purchase two green and two yellow flags (for a total of seven flags) because these colors are used more and wear out more quickly.

The flag is pennant style and the dimensions are 3'x 5'. You may choose plain flags or flags with logos, graphics, or words (note that extra printing on the flags will cost more and may not be visible once the flag is raised on the flagpole). A set of five flags will usually cost under $100. The price often goes down if you order a large quantity of flag sets at the same time, so consider joining with other schools when you order your flags.

Step 2: Educate and inform the school and the community at the start of the program

Choose a date to begin flying your flags, and then begin to educate and inform your school and the surrounding community. Some suggestions on when to start are Earth Day (April 22) or Air Quality Awareness Week (the first week in May, the beginning of the ozone season), but any date will do.

Register your program on EPA's school flag website (www.airnow.gov/schoolflag under "School Flag Program Registration Form"). EPA will add your school to the online table of participating schools and will send you an official participation certificate for display.

Train school personnel about the Air Quality Index and the Flag Program so they can help administer the program and teach the students. Encourage teachers to take advantage of the many resources available on the School Flag Program website at www.airnow.gov/schoolflag. These include:

- a coloring page
- activity sheets
- a fact sheet
- a children's picture book
- interactive games
- lesson plans about air quality
- an air quality simulator
- asthma resources for schools

Make announcements to the school community through newsletters, emails, flyers, and other communication routes. Notify members of the larger community through a local newspaper, newsletter, or radio station. Here is an example newsletter announcement:

New Flag Program

How much pollution is in the air outside today? Soon, our entire school community will have a simple way to find out….just look up! Starting [insert date], we'll be flying a brightly colored flag below our American flag that will show how clean or polluted the air is. This new flag program will help us continue to promote exercise while protecting health.

Each colored flag corresponds to an air quality level:

- Green – good air quality
- Yellow – moderate air quality
- Orange – unhealthy for sensitive groups, including all children and those with asthma or other respiratory issues
- Red – unhealthy for everyone
- Purple – very unhealthy for everyone

On green and yellow days, teachers and coaches will encourage students to get outside and get moving! When air quality is orange or red, it is still OK to play outside, but we will encourage kids to cut back on activities that involve lots of running. On those days, we will also make indoor play space available for any child who has asthma or who complains of difficulty breathing. In addition to helping us plan for exercise, the flags will help students and staff with asthma get to know whether their symptoms get worse when air quality is poor and whether they need to take extra steps to protect their health.

The flag program is used in many U.S. cities and we're proud to be the first school in [city] to adopt it. Thanks to our PTA for buying the flags! In addition to the new flags, we will have in-class activities [include when] to learn more about air pollution, how it affects us, and what we can do to make the air cleaner.

We will post more information about this exciting new program and our [date] flag raising event on our school website.

Step 3: Find out the daily air quality forecast and fly the corresponding flag

Like the weather, air quality changes from day to day. Your local or state air quality agency makes a daily air quality forecast that predicts the AQI color for both ozone and particle pollution. The forecast appears in late afternoon and predicts the air quality for the next day.
See page 9 for a detailed explanation of the AQI.

In many cities you can get the daily air quality forecast sent to you by email if you subscribe to EnviroFlash. You can see if your local area participates (by entering your zip code in the specified field) and also sign up at www.airnow.gov/enviroflash. This service also provides alerts when there are unusual air quality events such as wildfires.

You can also find the air quality forecast online at www.airnow.gov.

Air Quality Forecast for Anytown, USA

Today's High		**Tomorrow's High**	
Air Qualty Index (AQI)		Air Qualty Index (AQI)	
	Unhealthy for Sensitive Groups		Unhealthy
Health Message: People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.		**Health Message:** People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion.	
AQI - Pollutant Details			
Ozone	130 Unhealthy for Sensitive Groups	Particles (PM2.5)	156 Unhealthy
Particles (PM2.5)	57 Moderate	Ozone	57 Moderate

In this example, "Today's High" is forecast to be orange (unhealthy for sensitive groups) and "Tomorrow's High" is forecast to be red (unhealthy). The "Pollutant Details" tell you the specific pollutant that is driving the forecast. For the current day, ozone is the pollutant that is causing the air quality color to be orange. For tomorrow, particles (PM2.5) are driving the red forecast.

Each morning, assign someone at your school to raise the flag that shows the current day's AQI color. It is a good idea for the assigned person to check the air quality forecast in the morning before the flag is raised. Some state and local air quality agencies will update the current day's forecast to a different color if pollution is worse than originally expected. If you subscribe to EnviroFlash emails, you can choose to be notified via email of forecast updates. Such updates will also be posted on airnow.gov.

Fly only the flag showing the current day's forecast. For example, if you receive tomorrow's forecast in the late afternoon, do not change the flag to show tomorrow's color.

Some ideas to involve students and teachers in the flag program:

- Encourage everyone with an email account to sign up for EnviroFlash if it's available in your area.
- Establish student teams to be in charge of checking the forecast and raising the flag each morning.
- Have each classroom teacher assign a rotating student to post the day's air quality color in the classroom.
- Add a message about the day's air quality color to the daily announcements.
- Get the current AQI forecast added to your school's website. You can do this by providing the following link to the person responsible for your school's website: www.airupdate.info

Step 4: Know what actions to take when the air quality is unhealthy

General Actions When Ozone or Particle Pollution Levels are Unhealthy

Ozone and particle pollution are the most widespread air pollutants. When either ozone or particle pollution is at an unhealthy level, the chances of being affected increase the longer a person is active outdoors and the more strenuous the activity. Since exercise is good for your health, it's important to stay active and know when to make changes.

Children (including teenagers) and those with asthma are two groups EPA considers "sensitive" because they have more health effects at lower pollution levels. For a complete list of sensitive groups, see page 8 (for ozone) and page 9 (for particle pollution) in the Background Information section of this handbook.)

Actions:

- As either ozone or particle pollution levels become unhealthy, the general advice is to reduce: (1) how hard you exercise, and (2) the length of time you exercise. For example, on code orange days, it is still o.k. for children to play outside, but they should reduce activities that involve running and take more frequent breaks.
- Sensitive groups, including children and people with asthma, should start taking it easier at code orange alert levels.
- When either ozone or particle pollution is in the air, adults and children with asthma are more likely to have symptoms. Be alert for symptoms and follow the child's asthma action plan. If a child has a quick relief inhaler, be sure it is always handy.

Specific Actions When Ozone Pollution is at an Unhealthy Level

Ozone is formed when pollutants emitted by industrial facilities and power plants, motor vehicle exhaust, and other sources react in the presence of heat and sunlight. Since heat and sunlight drive ozone formation, warm sunny days have more ozone than cool or cloudy days. Ozone levels are generally much lower in the mornings. (See page 8 in Background Information section of this handbook for a more detailed discussion.)

Actions:

- When unhealthy levels of ozone are expected, you can limit exposure by playing and exercising outdoors before noon.
- For specific recommendations on how to modify outdoor school activities such as recess, physical education (P.E.) class, or sporting events when ozone pollution is elevated, see the chart called Air Quality and Outdoor Activities: Recommendations for Schools (the last page of this handbook).

Specific Actions to Reduce Exposure to Particle Pollution

In some locations (such as the western United States) where wood is burned for heat, particle pollution levels can be especially high during wintertime inversions. An inversion occurs when a layer of cooler air is trapped near the ground by a layer of warmer air above. When the air cannot rise, pollution at the surface is trapped and can accumulate, leading to higher pollutant concentrations. A variety of conditions can cause inversions to form. The most common is a nighttime inversion, when cloudless skies allow air at the surface to cool faster than the air above.

Actions:

- Choose areas away from busy streets for children to walk, exercise and play.
- Make sure children avoid standing or playing near vehicles that are idling.
- Implement policies and education programs to limit idling by school buses and personal vehicles (parent drop off/pickup) on school grounds.
- If it looks or smells smoky outside, it is better not to exercise or play outside.

Use Your Judgement

Based on the recommended actions listed here and the chart provided on the last page of this handbook, school staff should use their judgment to decide how to modify planned outdoor activities when air quality is unhealthy.

Background Information

What is Ozone?

Ozone is a colorless gas found in the air we breathe. Naturally occuring ozone high above the earth's surface protects our planet from solar radiation. When ozone is created near the ground it is unhealthy to breathe and can also damage trees and crops.

Ozone is created at ground level by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from industrial facilities and power plants, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NOx and VOC. Because ground-level ozone needs sunlight to form, it is usually highest during the hot, sunny days of summer, spring, and fall.

Within the last decade, however, high ozone concentrations have also been observed under specific circumstances in cold months. Specifically, there are a few high elevation areas in the Western U.S. where high levels of local VOC and NOx emissions have formed ozone when snow is on the ground and temperatures are near or below freezing. Ozone contributes to what we typically experience as "smog" or haze, which still occurs most frequently in the summertime, but can occur throughout the year in some southern and mountain regions.

Health Effects of Ground-level Ozone

- Constriction of airways forcing the respiratory system to work harder to provide oxygen
- Coughing, pain when taking a deep breath, wheezing and inflammation of the airways including the deep portions of the lungs
- Increased fatigue
- Reduced athletic performance
- Aggravated lung disease

For ozone, people with lung disease, children, older adults, and people who are active outdoors are considered sensitive and therefore at greater risk.

What is Particle Pollution?

Particles in the air are a mixture of solids and liquid droplets that vary in size and are often referred to as "particulate matter." Some particles - those less than 10 micrometers in diameter - pose the greatest health concern because they can pass through the nose and throat and get deep into the lungs. Ten micrometers in diameter is just a fraction of the diameter of a single human hair. Particles larger than 10 micrometers do not usually reach your lungs, but they can irritate your eyes, nose and throat. Particle pollution, unlike ground-level ozone, can occur year-round.

Very small particles with diameters less than 2.5 micrometers are called "fine" particles. They are produced any time fuels such as coal, oil, diesel or wood are burned. Fine particles come from fuel used in everything from power plants to wood stoves and motor vehicles (e.g., cars, trucks, buses and marine engines). These particles are even produced by construction equipment, agricultural burning, trash and brush burning, and forest fires. In fact, forest fires (wildfires) are responsible for some of the worst particle pollution events.

"Coarse" dust particles range in size from 2.5 to 10 micrometers in diameter. Particles of this size are produced during crushing or grinding and from vehicles traveling on paved or unpaved roads.

Health Effects of Particle Pollution

- Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing
- Decreased lung function
- Aggravated asthma
- Development of chronic bronchitis
- Irregular heartbeat
- Heart attacks
- Premature death in people with heart or lung disease

For particle pollution, people with heart or lung disease, older adults, and children are considered sensitive and therefore at greater risk.

What is the Air Quality Index (AQI)?

The Air Quality Index (AQI) is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air.

How Does the AQI Work?

The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI level of 50 represents good air quality with little potential to affect public health, while an AQI value over 201 represents very unhealthy air quality.

An AQI value of 100 generally corresponds to the National Ambient Air Quality Standard (NAAQS) for the pollutant, which is the level EPA has set to protect public health. AQI values below 100 are generally thought of as satisfactory. When AQI levels are above 100, air quality is considered to be unhealthy – at first for certain sensitive groups of people, then for everyone as AQI values get higher.

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	...air quality conditions are:	...as symbolized by this color:
0 to 50	Good	Green
51-100	Moderate	Yellow
101-150	Unhealthy for Sensitive Groups	Orange
151-200	Unhealthy	Red
201-300	Very Unhealthy	Purple

The purpose of the AQI is to help you understand what local air quality means to your health. To make

it easier to understand, the AQI is divided into categories. Each category corresponds to a different level of health concern. The levels of health concern and what they mean are:

Air Quality Index Levels of Health Concern	Meaning
Good	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	Health alert: everyone may experience more serious health effects.

Resources

For a list of additional resources, visit www.airnow.gov/schoolflag and choose "Teacher, Student and School Resources." The links include lesson plans, student pages, interactive games, asthma resources for schools, and further information on pollutants and health effects.

Your state or local air quality agency may offer free materials such as brouchures to educate parents and posters to help display the daily forecast in classrooms, school offices and lobbies. Click on the United States map at http://www.airnow.gov/ to find information on your state or local agency.

United States
Environmental Protection
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Office of Air Quality Planning and Standards
Outreach and Information Division
Research Triangle Park, NC

Publication No. EPA-456/B-11-001
November 2011

Air Quality and Outdoor Activities: Recommendations for Schools

Air Quality Index (AQI) Chart for Ozone (8-hr standard)

ACTIVITY	0 to 50 GOOD	51 to 100 MODERATE	101 to 150 UNHEALTHY FOR SENSITIVE GROUPS	151 to 200 UNHEALTHY	201 to 300 VERY UNHEALTHY
Recess (15 min)	No Restrictions	No Restrictions	Make indoor space available for children with asthma or other respiratory problems.	Any child who complains of difficulty breathing, or who has asthma or other respiratory problems, should be allowed to play indoors.	Restrict outdoor activities to light to moderate exercise.
P.E. (1 hr)	No Restrictions	No Restrictions	Consider making indoor play space available for children with asthma or other respiratory problems.	Any child who complains of difficulty breathing, or who has asthma or other respiratory problems, should be allowed to play indoors.	Restrict outdoor activities to light to moderate exercise not to exceed one hour.
Scheduled Sporting Events	No Restrictions	Individuals who are unusually sensitive to ground-level ozone should limit intense activities.	Individuals with asthma or other respiratory or cardiovascular illness should increase rest periods and reduce activities to lower breathing rates.	Consideration should be given to rescheduling or relocating event.	Event should be rescheduled or relocated indoors.
Athletic Practice and Training (over 1 hr)	No Restrictions	Individuals who are unusually sensitive to ground-level ozone should limit intense activities.	Individuals with asthma or other respiratory or cardiovascular illness should increase rest periods and reduce activities to lower breathing rates.	Activities over 1 hour should decrease intensity and duration. Add rest breaks or substitutions to lower breathing rates.	Sustained rigorous exercise for more than one hour should be rescheduled, moved indoors or discontinued

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Office of Air and Radiation(6301A)
November 2011
EPA-456/F-11-005

HOW TO USE THIS CHART

This chart is for restrictions of outdoor activities affected by ground-level ozone pollution. It should be used to modify plans for outdoor activities such as recess, lunch, and physical education class. It is best used in conjunction with ozone air quality forecasts. If a code red ozone day is expected, consider moving prolonged or vigorous activities inside or rescheduling them to morning hours to decrease exposure to ozone pollution. Next day air quality forecasts are updated by 5 pm Eastern Time and the ozone maps or measured air quality levels are updated hourly. Both can be viewed at www.airnow.gov.

Here's an example of how this chart may be used to determine changes for a Friday afternoon physical education program:

Step 1: Thursday afternoon, check the air quality forecast for Friday at www.airnow.gov. While there, sign up for EnviroFlash at www.airnow.gov/enviroflash, to receive the forecast by e-mail.

Step 2: If the air quality forecast for Friday is Orange, or Unhealthy for Sensitive Groups, make arrangements to have indoor space available for children with asthma or other lung diseases.

Step 3: On Friday before class, go to www.airnow.gov to check if there are any updates to the forecast. Some state and local air quality agencies will update the current day's forecast to a different color if pollution is worse than originally expected. If you subscribe to EnviroFlash emails, you can choose to be notified via email of forecast updates.

The health benefits of regular exercise are well documented. The intent of this chart is to help children continue to exercise while protecting their health when air quality is poor. Even when air quality is poor, exercise can be continued indoors. Indoor air can have significantly less ozone than outdoor air.

Health Effects of Ground-level Ozone (O3)

- Constriction of airways forcing the respiratory system to work harder to provide oxygen
- Coughing, pain when taking a deep breath, wheezing and inflammation of the airways including the deep portions of the lungs
- Increased fatigue
- Reduced athletic performance
- Aggravated lung disease

Long-term exposure to polluted air can have permanent health effects including decreased lung function, possible development of diseases such as asthma and bronchitis, or a shortened life span. Ground-level ozone reaches its highest level during the afternoon and early evening.

Please note: Before cancelling a scheduled outdoor athletic event, call your local air quality agency for up-to-date information for your specific location.

Resources: AIRNOW (www.airnow.gov), EnviroFlash (www.airnow.gov/enviroflash)

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* For wildfires or other air pollution episodes, it may be necessary to modify these recommendations to minimize outdoor physical activities. In this situation, contact your local Air Quality Agency for more details.