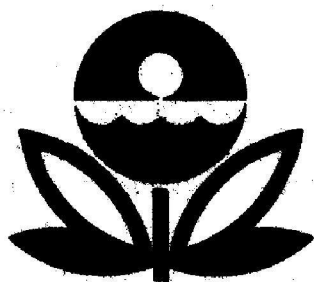


air pollution episodes

A CITIZEN HANDBOOK



**U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460**

Foreword

air pollution episodes

**“Air is our most vital resource,
and its pollution is our most serious
environmental problem . . . Pollution
can quite literally make breathing
hazardous to health.”**

PRESIDENT RICHARD M. NIXON, FEBRUARY 10, 1970

The 1970 amendments to the Clean Air Act accelerate a national campaign to bring air pollution under control that began in 1963 when the Act was originally conceived.

Under these amendments, the federal government sets national air quality standards, and the states, after holding public hearings, adopt plans for achieving the standards by 1975.

We are confident that with public support this federal-state systematic campaign to bring the sources of air pollution under control will result in considerable improvements in air quality in every state in the union.

However, as we move forward over the next several years toward air quality standards, we must be prepared to cope with emergency situations—with air pollution “episodes”.

An air pollution episode occurs when adverse weather conditions—usually low winds and a temperature inversion—permit abnormally high concentrations of pollutants to build up in the air.

The likelihood of air pollution episodes will diminish as the campaign to achieve air quality standards advances. But as long as episodes are possible, we must have an emergency plan if we are to insure that we protect the public health.

As part of this plan the Clean Air Act empowers the Environmental Protection Agency to take emergency action when pollution reaches levels that present what the Act calls “imminent and substantial endangerment” to human health. But the prime responsibility for making sure that an air pollution episode does not occur rests with the States and with local governments, within the framework of the Clean Air Act.

This publication outlines the ingredients of an effective emergency plan—the preventive measures which control agencies can take to minimize the danger of air pollution episodes. Further, this publication describes what citizens can do to support their agency’s efforts, and to make sure that in their own communities proper episode control measures are carried out.

As President Nixon has said, “in the final analysis, the foundation on which environmental progress rests in our society is a responsible and informed citizenry”.

WILLIAM D. RUCKELSHAUS
ADMINISTRATOR
ENVIRONMENTAL PROTECTION AGENCY

Disaster

On October 27, 1948, stagnant air, fog and factory fumes combined to grip the small industrial town of Donora, Pennsylvania, in a thick black smog. Before the air was cleared by wind and rain some four days later, 20 people were dead. More than 5,900 of the town's total population of approximately 14,000 became sick. Coughs, sore throats, hard breathing, irritated eyes, nausea and vomiting were common. Heart disease and bronchitis patients suffered greatly. Many required emergency oxygen treatment.

The Donora disaster was the first recorded air pollution episode in the United States. It etched Donora's name in the annals of air pollution, along with London, which recorded its first air pollution episode in 1873, with 650 deaths, and the Meuse Valley in Belgium, where 60 to 80 people died and more than 6,000 were made sick in five days of high air pollution levels in 1930.

Anatomy of an episode

What is an air pollution episode? Detailed analysis of the evidence of past episodes reveals these major characteristics:

- Stagnant air produced by low wind speed and temperature inversion.
- As concentrations of smoke, sulfur dioxide, particulates and other pollutants increase, coughing, eye irritation and sickness increase.
- Deaths increase as pollutant levels reach peaks.
- Death and illness occur in all age groups.
- Excess deaths increase with increasing age.
- Deaths are generally caused by respiratory or heart problems.
- The impacts on health are rapid and are due to a combination of several pollutants.
- The episode lasts two to seven days.

London has since experienced more episodes. The worst was in 1952, when a five-day killer smog took 4,000 lives and sickened uncounted thousands more.

Germany, Japan and other industrialized nations have also experienced air pollution episodes.

New York City has reported several air pollution episodes. One, in 1963, was blamed for 200-400 deaths.

Cities which have recorded air pollution episodes represent only the tip of the iceberg, however. Air pollution experts believe that many episodes or borderline cases have gone unreported in the past because monitoring equipment was not available to record pollutant levels, because the number of people affected was not large enough to attract public attention, or simply because air pollution was not recognized as the cause of increased discomfort or illness.

But in recent years public awareness and understanding of air pollution have grown. At the same time, our population has increased, and the sources of air pollution have increased. More people mean more factories, more power plants, more automobiles, more trucks—more fuel-burning, emission-producing processes.

Today, many areas, regardless of size, can become air pollution episode statistics if the forces of nature, in the form of unfavorable weather conditions, conspire with pollutants emitted into the air.

Among areas in the United States subject to stagnant air conditions, which are conducive to air pollution episodes, are Baltimore, Md.; Birmingham, Ala.; Buffalo, N. Y.; Charleston, W. Va.; Chattanooga, Tenn.; Chicago, Ill.; Cleveland, Ohio; Detroit, Mich.; Houston, Texas; Los Angeles, Calif.; Northern New Jersey; New Orleans, La.; New York, N. Y.; Philadelphia and Pittsburgh, Pa.; St. Louis, Mo.; and Washington, D. C.

And at times, wide areas of the country can be simultaneously blanketed with a cover of stagnant air. This occurred in 1962 and 1966 in the eastern part of the nation.

What follows is an outline of a program which can prevent serious air pollution episodes from developing at times of stagnant air conditions.

Preventing disaster

Under the Clean Air Act, each state is required to adopt a plan—after holding a public hearing—to implement, maintain and enforce national air quality standards set by EPA. The plan is subject to Federal approval.

The State implementation plan must include emergency steps to prevent pollutants from reaching levels at which “significant harm” to human health might occur. Pollutant concentrations which would cause significant harm to human health have been identified by the Environmental Protection Agency, based on the best available scientific evidence. (See Table I)

The states may use different techniques to prevent air pollution from ever reaching “significant harm” levels during an episode. *How* this goal is achieved is up to each state. However, a state’s air pollution episode contingency plan must meet certain minimum requirements set by the Federal government. The plan must:

- Be backed up by a state law which empowers the state to enforce it.
- Establish two or more stages of action during an episode.
- Provide for public announcement when each episode stage is reached.
- Include specific actions to be taken immediately by major stationary sources and mobile sources of air pollution to reduce or stop emissions at each stage of an episode.
- Provide for daily acquisition of forecasts of air stagnation conditions.
- Provide for rapid monitoring of air pollution levels during episodes.
- Provide for inspection of pollution sources during an episode to assure compliance with emission control orders.
- Provide a communications system to alert pollution sources, transmit emission control orders, keep public officials, the news media, and the public informed.

In practice, many states have delegated authority for air pollution control to local governments. Implementation of an air pollution episode contingency plan is carried out by the appropriate city, county or regional air pollution control agency. However, States are still responsible to

see to it that appropriate action is taken if an episode develops.

To carry out the Federal government's air pollution episode control responsibilities under the Clean Air Act, the Environmental Protection Agency has set up an Emergency Operations Control Center at Durham, North Carolina. There EPA maintains a continuous nationwide watch of meteorological and air quality conditions. Air quality reports flow into the control center each day from a national network of Federal, state and local air pollution monitoring stations. Weather reports flow into the control center from the National Weather Service's (NWS) nationwide surveillance system.

If an "air stagnation advisory" is issued by the NWS, or if air quality reports show an increase in pollution levels, the control center puts EPA's episode procedures into effect.

EPA analyzes actions taken by state and local control authorities during potential and actual air pollution episodes, steps up pollution monitoring, provides advice and assistance—and, if necessary, institutes direct Federal action, including seeking court injunctions against polluters, to prevent emergency pollution levels from developing.

That, in brief, is the framework of the nation's program to prevent air pollution episodes.

A model for action

Air pollution episode contingency plans will vary somewhat according to a community's particular air pollution problems and other factors. On the east coast, for example, sulfur dioxide and particulates are serious problems, while the greatest problem in the Los Angeles area is oxidants. An episode plan must therefore be tailored to each community's own needs.

However, air pollution problems in most areas have much in common, and it is possible to describe how a typical episode plan might evolve and operate:

First, the state or local air pollution control agency prepares a proposed air pollution episode contingency plan as part of a total implementation plan to meet the national air quality standards. The proposed plan is made available to interested organizations and individuals. The

state then holds a public hearing, as required by federal law, on the proposed plan. The hearing gives public officials, industry and civic organization representatives, and the general public an opportunity to comment on the proposed plan and to suggest changes.

The state then reviews the public hearing record, considers recommended changes, adopts the plan, submits it to EPA for review. If the plan meets Federal requirements, EPA approves it. (The plan may be more stringent than Federal requirements if state-local authorities desire.) The control agency then puts the episode contingency plan into effect.

The plan

The prime objective of the air pollution episode contingency plan is to assure that pollution levels *never* reach the point of "significant harm" to human health. This requires pre-planning for action long before an episode develops:

- Plans are made to receive daily weather forecasts and to monitor pollution levels daily at all times and more frequently if an episode occurs.

- All factories and other stationary sources of air pollution within the control agency's jurisdiction are identified. Information is obtained on the types and amounts of hourly and daily emissions of pollutants from each of these sources.

- Emission reduction schedules are established for each major source of pollutants for each stage of an episode.

- A communications system is created to enable the control agency to immediately alert public officials, sources of pollution, doctors, hospitals, the press, and the general public if an episode develops.

- An education program may be initiated to inform the public about the seriousness of air pollution episodes, the control agency's program for dealing with episodes, and precautions to be taken should an episode occur.

- And a multiple stage air pollution episode procedure is established with appropriate pollution level criteria. EPA requires at least two stages; suggested here is a four stage procedure:

1. Air Pollution Forecast Stage.

The forecast is triggered when a weather report indicates adverse meteorological conditions are likely to produce stagnant air and elevated pollution levels. The control agency prepares for a possible episode. It alerts its staff. It alerts pollution sources and the community through its communications system.

2. Air Pollution Alert Stage.

The alert is triggered if any one of the pollution level criteria for this stage (see Table 2) is reached at any monitoring station, and if adverse weather conditions are expected to continue for 12 hours or more.

Open burning is banned. Use of incinerators, as well as boiler cleaning and soot blowing, are confined to hours of maximum air movement, usually 12 noon to 4 P.M.

Pollution sources—factories, power plants, etc.—are directed to cut pollution in accord with pre-arranged emission reduction schedules. Power plants burning coal or oil are directed to make substantial emission reductions by switching to fuels with low ash and low sulfur content and by bringing in some power from generating plants outside the area, permitting a cut in local generation.

Inspections are made to assure compliance. Action is taken against violators.

The public is notified, advised to take health precautions, and asked to voluntarily reduce unnecessary driving, and to cut back on the use of electricity.

3. Air Pollution Warning Stage.

The warning is triggered if any one of the pollution levels for this stage (see Table 2) is reached at any monitoring station and if poor weather is expected to continue for 12 hours or longer.

The ban on open burning continues. Use of incinerators is prohibited. Boiler cleaning and soot blowing remain limited to 12 noon to 4 P.M.

Pollution sources are ordered to make further emission reductions in accord with prearranged schedules. Power plants are directed to make

maximum use of low ash, low sulfur fuels, and to import maximum power supplies available from outside the area to substitute for as much local generation as possible.

Inspectors continue to check for compliance and action is taken against violators.

The public is kept informed, advised again about health precautions, and asked again to voluntarily reduce driving and the use of electricity.

4. Air Pollution Emergency Stage.

An emergency is called if monitoring shows air quality is continuing to grow worse and is approaching levels of "imminent and substantial endangerment" to health. The Emergency is triggered if any one of the pollution levels for this stage (see Table 2) is recorded at any monitoring station and if adverse weather is expected to continue for 12 hours or more.

All previously ordered emission restrictions are continued. The public is told of the seriousness of the situation.

In addition, the use of motor vehicles is banned except in emergencies with the approval of state or local police. Schools, libraries, local and state government offices (except those needed for public safety and welfare) are ordered to close.

Nonessential office, retail, wholesale and commercial operations are directed to close. Manufacturing plants with prearranged emission reduction schedules are ordered to put maximum pollution abatement procedures into effect and to stop operations if possible.

Inspections continue and action is taken against violators.

That's the outline of an air pollution episode plan in action. If it is properly planned and carried out, control actions taken in the early stages of an episode will prevent pollution levels from reaching the emergency stage.

But the community must be prepared for the worst. The community must be prepared to cooperate, to avoid panic, to accept inconveniences and restrictions on personal freedom, and to forego personal gain.

The community must be prepared to accept whatever social and economic costs are necessary to keep pollution under control during an episode.

What citizens can do

A concerned and aware public in any community can help assure that its episode plan contains the ingredients for success and is implemented when an episode develops.

In many communities, voluntary citizen organizations have been created to work for clean air. They articulate the public's desire for improved air quality, contribute to public understanding of air pollution problems, encourage and support the control agency's pollution abatement programs, and conduct education campaigns on the need for air pollution control measures.

These citizen groups often play a part in the establishment and implementation of air pollution episode contingency plans. They do so by:

- Reviewing a control agency's proposed episode plan.
- Participating in the public hearing on the plan and, if they deem it necessary, recommending improvements.

Telling the episode story

What should the public be told in event of an air pollution episode? According to the Metropolitan Washington Coalition for Clean Air, a local citizen organization operating in the District of Columbia and nearby portions of Maryland and Virginia, the public should be given at least this information:

- Stage reached, weather forecast, and likely duration of episode conditions.
- Highest pollutant concentration reached so far.
- Health warning and advice to sensitive persons.
- Recommended restrictions on personal activities at each stage.
- Mandatory restrictions at each stage.
- Periodic reports of actions taken by major polluters.

- Supplementing the control agency's public education program on the need for the episode plan and how it works, through their own publications, in talks before other groups, and by direct contacts with the press. Citizen organizations can be a major source of public information on what the plan provides, what individual citizens can do during an episode, and what special precautions should be taken by "sensitive" segments of the population, such as the elderly and those suffering from heart and respiratory disease.

- Preparing the public for inconveniences and restrictions on personal activities which might accompany an episode.

- Supporting and cooperating with the control agency when an episode occurs. They arrange

What to do if heavy air pollution is

If there's danger of an air pollution episode, the following precautions are recommended:

1. Curtail physical activity, both indoors and outdoors. (The more active you are, the more breaths you take—and the more pollutants you breathe in.)

2. Stay indoors as much as possible and keep windows closed. (Pollution levels are usually lower indoors than out. And buildings themselves act as filters of sorts, blocking or absorbing some pollutants.)

3. Avoid smoke filled rooms. If you are a smoker, stop or cut down smoking.

4. Don't use your fireplace.

5. Don't use your incinerator.

6. Don't drive if possible. If you must travel, use a public transportation. If you must drive, form car pools, avoid busy streets and expressways. If you have a choice, take a bridge instead of a tunnel. If you must use a tunnel, keep car windows and ventilator closed.

7. If you're on the street and a bus or truck emits a cloud of exhaust, hold your breath.

8. Do not wear contact lens.

9. In the winter months, use a humidifier or vaporizer to add moisture to your home. (Moisture helps you breathe easier.)

to be notified as soon as an episode is forecast. They offer volunteers to help the control agency man telephones to handle public inquiries. They offer assistance in surveillance of pollution sources after emission reductions are ordered. They notify hospitals, nursing homes, convalescent homes—previously identified sensitive segments of the population—so they can take special precautions.

- Analyzing the implementation of a plan during an episode and making recommendations for improvement if needed.

In sum, a citizen group organized to muster public opinion in behalf of effective air pollution control programs can be an invaluable community asset when an episode develops.

forecast

10. Cut down on water use. (Electricity is needed to pump water and sewage systems, and to run sewage treatment plants.)

11. Cut down on use of electricity. Keep nonessential lights off. Postpone running washing machine, dryer, dishwasher, other non-essential appliances.

12. Lower room temperature in your home if health considerations permit.

13. Postpone indoor cleaning jobs that circulate dust, such as sweeping, vacuuming.

14. Postpone outdoor jobs that raise dust, such as raking leaves, sweeping sidewalks, excavating land, etc.

15. Don't use the phone unless it's essential. (Telephone circuits can be overburdened in emergencies.)

Special precautions

(For the elderly, chronically ill, heart and lung patients, bronchitis, asthma, and emphysema sufferers, post-operative patients, and newborn infants)

Stay indoors, keep windows closed, and follow the other appropriate suggestions listed above. In addition:

1. If you have an air filtering system or air conditioner, turn it on.

2. If you're on medication, take it at the first sign of worsening symptoms and call your physician.

The President's Council on Environmental Quality observed in its second annual report: "The ability of citizens and citizen groups to make their views known and to participate in government decision-making on the environment is critically important. Often individuals and groups can contribute data and insights beyond the expertise of the agency involved. . . . The new openness to citizen involvement is bound to check, stimulate, and test future Federal agency activities. Citizen concern cannot substitute for assumption of environmental responsibilities by government and industry. Nor can it provide the mechanism to resolve the many policy issues involved. What it can provide, however, is a highly potent quality control and feedback."

Table 1

**Air pollution levels that could cause
"significant harm" to the health
of persons***

Sulfur dioxide (SO₂)—1.0 parts per million (ppm),
24-hour average

or

Particulates—8 COHs, 24-hour average

or

Combined SO₂ and Particulates—Product of 24-
hour average of SO₂ and COHs of 1.5

or

Carbon Monoxide (CO)—

50 ppm, 8-hour average

75 ppm, 4-hour average

125 ppm, 1-hour average

or

Oxidants (Ox)—

0.4 ppm, 4-hour average

0.6 ppm, 2-hour average

0.7 ppm, 1-hour average

or

Nitrogen Oxides (NO₂)—

2.0 ppm, 1-hour average

0.5 ppm, 24-hour average

* Established by EPA October 19, 1971.

Table 2

Suggested criteria for Air Pollution Episodes

Alert Stage

An Air Pollution Alert goes into effect if:

SO₂ reaches 0.3 ppm, 24-hour average,

or

Particulates reach 3.0 COHs, 24-hour average,

or

Combined SO₂ and Particulates product reaches 0.2,

or

CO reaches 15 ppm, 8-hour average,

or

Ox reach 0.1 ppm, 1-hour average,

or

NO₂ reaches 0.6 ppm, 1-hour average and 1.15 ppm, 24-hour average

and

Meteorological conditions are such that pollutant concentrations can be expected to remain at these levels for 12 hours or more, or increase unless control actions are taken.

Warning Stage

An Air Pollution Warning goes into effect if:

SO₂ reaches 0.6 ppm, 24-hour average,

or

Particulates reach 5.0 COHs, 24-hour average,

or

Combined SO₂ and Particulates product reaches 0.8,

or

CO reaches 30 ppm, 8-hour average,

or

Ox reach 0.4 ppm, 1-hour average,

or

NO₂ reaches 1.2 ppm, 1-hour average and 0.3 ppm, 24-hour average,

and

Meteorological conditions are such that pollutant concentrations can be expected to remain at the above levels for 12 hours or more, or increase unless control actions are taken.

Emergency Stage

An Air Pollution Emergency goes into effect if:

Table 2 cont'd

SO₂ reaches 0.8 ppm, 24-hour average,
or
Particulates reach 7.0 COHs, 24-hour average.
or
Combined SO₂ and Particulates product reaches
1.2,
or
CO reaches 40 ppm, 8-hour average,
or
Ox reach 0.6 ppm, 1-hour average,
or
NO₂ reaches 1.6 ppm, 1-hour average and 0.4
ppm, 24-hour average,
and
Meteorological conditions are such that this con-
dition can be expected to continue for 12 hours
or more.

