EarthDate

The Great Smog

Nelson's Column in London during the "Great Smog" of December 1952.

You've heard of the London fog, but how about the "London Smog"?

Well, it killed at least 8,000 people and sent another 150,000 to the hospital. How was this?

In the years after World War II, England had rebuilt its factories and power stations, and all were burning coal. London residents, too, were burning coal in their homes to keep warm.

But England had sold its premium coal to pay war debts and was using a poor grade with high sulfur content.

On a particularly cold winter day in 1952, with furnaces and fireplaces working overtime, a fog rolled in.

Fog is just a cloud on the ground. It forms when humid air cools and its water vapor condenses. This time, there was also a high pressure area that sat over London.

Together they trapped the coal emissions, and the fog became the "Great Smog."

Sulfur dioxide in the smoke mixed with water vapor in the fog to form a dilute sulfuric acid. As the water evaporated, the fog became ever-more acidic and stank of rotten eggs.

Breathing it damaged lungs and led to serious lung infections.

Hospitals overfilled. People began dying in such numbers that undertakers ran out of coffins. Finally, 5 days after it began, wind blew the toxic fog out to sea.

Today, scientists are using lessons from the Great Smog to mitigate the effects of smog in China and other industrializing areas that depend on coal for electricity.

Bureau of Economic Geology

Background: The Great Smog

Synopsis: London is well known for its fog, but 65 years ago, the fog turned into a yellow smog that caused at least 12,000 deaths. Why did it turn deadly? Could it happen again or in other cities?

- In early December 1952, London's famous fog turned into a yellow smog.
  - Fog, essentially a cloud at ground level, is influenced by nearby bodies of water, topography, wind, and weather conditions.
  - On December 5, a high-pressure system brought cold temperatures and trapped the fog over London.
  - Because of the cold, residents burned coal to stay warm; the lower-quality coal available produced a noxious smoke that smelled like rotten eggs.
  - The smelly smoke was concentrated within the trapped fog, which grew to more than 30 miles wide under the high-pressure cap that held it down to the ground.
  - Buses, planes, and boats came to a halt because the smog was so thick.
  - The sooty fog coated the sidewalks and faces of those who walked outside.
  - The smoky fog was deadly—by the time it lifted on December 9, more than 150,000 people had been hospitalized and 4,000 people had died. Another 8,000 people died afterward of maladies related to the smog.
  - This tragic event led to the passage of the British Clean Air Act of 1956.
- Texas A&M researchers studying smog in China discovered what made the smog so deadly.
  - Fog only forms when its water vapor is neutral, not acidic, pH.
  - Coal smoke contains sulfur dioxide, which gives the telltale smell of rotten eggs. The London smoke contained sulfur dioxide and nitrogen dioxide.
  - When the sulfur dioxide reacted with the water vapor in the fog, it created a very dilute sulfuric acid.
  - The critical factor that made the fog deadly was the evaporation of water vapor from the fog over the 5 days, which left behind more-concentrated sulfuric acid.
  - Breathing the acid, which is very damaging to the lungs, caused a massive number of casualties and illnesses in London.
- Does this happen in other places?
  - Researchers compared the smog in London to smog in some large Chinese cities, where coal-fired plants are common. The latter smogs are damaging but not deadly.
  - Along with sulfur dioxide and nitrogen dioxide, which form acids, the Chinese smogs also contain ammonia, which is a base that neutralizes acids, thus preventing the deadly concentration of acids that occurred in London.

References: The Great Smog

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