FORUM

Commentary

Shuttle launches destroy ozone

Ozone in the stratospheric layer of the atmosphere plays a crucial part in protecting life. When intense sunlight hits the high atmosphere, oxygen molecules are broken into two oxygen atoms. These atoms reassemble into an ozone molecule. The molecule's structure gives it the ability to absorb a certain kind of ultraviolet light (UV-B), which causes sunburn and skin cancer. The absorption of UV light also creates heat, which is deposited in the stratosphere, making it much warmer than lower layers and as a result, quite stable. This means that our protection from UV light is also stable.

Certain chemical catalysts (like chlorine) react with ozone and change it back into an oxygen molecule. Each day, ozone is created during the daylight hours by reacting with sunlight and is destroyed by naturally occurring chemicals in the stratosphere. As with everything in nature, a balance is maintained.

Catalysts such as chlorine are everywhere in today's industry. These atoms (generally in a molecule of some kind) escape into the stratosphere and upset the balance of ozone creation and reduction that occurs naturally. The result? Ozone is depleted at a much faster rate than can be replaced and the Earth loses protection from ultraviolet light.

The exhaust gases given off by the space shuttle are 20.9 percent hydrogen chloride. Each time the shuttle is launched, 187 tons of these ozone-eating hydrogen chloride molecules are released. A single shuttle flight can destroy up to 10 million tons of ozone. Theoretically, if we were to launch the shuttle 300 times in a row, we would completely destroy the ozone layer.

The only environmental impact statement conducted on the space shuttle was done in 1977. It states, "Potential adverse environmental effects associated with hydrogen chloride in the space shuttle exhaust cloud might be reduced by the use of a system for neutralization. ... Because of (the) cost, uncertainty in environmental consequences of neutralization, and the fact that the ground cloud can be controlled by meteorological conditions, the current plan is not to exercise the option of neutralization."

In the late 1970s, scientists had barely begun taking notice of what was happening in the stratosphere. No one knew that halogens such as chlorine and bromine (both widely used in industry) were responsible for ozone layer depletion. So we continued and expanded our use of chlorofluorocarbons and we repeatedly launched the space shuttle.

Now, research shows that "with each launch, .25 percent of the ozone layer is destroyed. ... The space shuttle has (already) destroyed 10 percent of the ozone layer." (See references.) This is as much damage as one CFC-emitting factory causes in one year. We have been regulating industry, we have introduced replacements for CFC spray cans, we have not been paying any attention to the fact that in under 10 years, the space shuttle has played a major role in ozone layer depletion. It would seem that science, the government and the media have turned heads.

There is a simple solution to this aspect of the ozone layer depletion problem. Stop launching the space shuttle until extensive research can be done on the environmental effects of a neutralization system. Do not launch the shuttle until a way is found to eliminate the effects of its HCL exhaust cloud.

I have illustrated and explained one aspect of a major problem and given a shockingly simple solution. How do we make this solution happen? Start with Congress, start protesting NASA, start doing all those things that this campus is good at doing — only this time, we have a problem everyone can be concerned with and a solution that everyone can be clear on.

My sources include: *Earth Island Journal* (Gar Smith, fall 1990); *The San Francisco Chronicle* (David A. Sylvester, Aug. 21, 1990); *The Sonoma State University Star* (Mindi Levine, May 8, 1990); *The Changing Atmosphere* (John Firor, 1990); The Environmental Impact Statement for the Space Shuttle (July 1977, pages 146-148).

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