

Review of "Pollution Caused by Fireworks"

by Doris Gnauck White,
American Environmental Laboratory,
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The basic problem with Professor White's paper is that she is preaching to the converted. Most subscribers to the *American Environmental Laboratory* understand that igniting any substance pollutes the air. These readers know that burning autumn leaves, having barbecues, or putting a log in the fireplace is outlawed in many areas of the country because it significantly impacts air quality.

For this reason, Professor White only felt it necessary to list 53 chemicals that might be found in fireworks and let readers imagine their breakdown products drifting off in a cloud of smoke. If she really wanted to worry her readers, she would have included lead azide "bombs" set off on movie sets, or discussed theatrical pyrotechnics where the audience and performers are trapped in an enclosed space with pyrotechnic emissions.

The author also made no attempt to quantify the pollution except to point out that fireworks are used all over the world and that many theme parks that set off effects daily. I have no doubt that, at least locally, these fireworks can be a significant source of pollution. However, it would be nice to know more about the actual volumes of various chemicals used in the U.S. and worldwide in fireworks.

I would fault Professor White for omitting quantity data in the article if it were not that the fireworks industry is not making this data easily accessible. I have never seen a professionally prefabricated effect that was labeled with all its ingredients and their amounts. Even the material safety data sheets (MSDSs) that I see usually withhold pyrotechnic ingredients and their amounts as trade secrets. Such is the case at the Palace Theater on Broadway where Beauty and

the Beast technicians set off "pyro" daily and twice on Wednesdays. The American Federation of Musicians has been unable to find out what is in the effects whose emissions their workers have been breathing for over two years.

Even worse, the chemicals released after ignition are not well known. Assuming you could identify all the ingredients in the effect, you then could use theories about the reactions to predict emissions. But actual emissions often vary from the theoretical. Air and residue sampling is needed and I don't see much of this data being compiled.

The MSDSs on pyrotechnic products also do not list the break down products after the effect is set off. Instead, the section on "decomposition products" on the MSDSs usually lists only the decomposition products of single chemicals if they were subjected to controlled toxic waste incineration. These individual chemical incineration emissions are very different from those given off when the two or more components are mixed and ignited.

Unfortunately, Professor White demonstrates her ignorance of this fact in her conclusions where she writes:

The author sent the New Jersey Board of Health, Right to Know Division (Trenton, NJ), an outline of this paper. In return, the author received seven boxes of technical information on the breakdown products and how they can harm humans, animals, plants and the environment in general.

She is almost certainly referring to the New Jersey Department of Health's "Hazardous Substances Fact Sheets". They are excellent sources of information, but they only list decomposition products of the individual chemicals. These data sheets will not be very helpful in assessing the breakdown products of fireworks made with these chemicals.

The Professor's concern about "heat pollution, which can result from being burned by fireworks" is spurious. Being burned is not pollution, it is an accident. But I found Professor White's statements about noise and light pollution valid. The author pointed out that children

and pets can be startled by bright lights and loud sounds.

Professor White could have strengthened her argument by including the impact of noise on people with weak hearts, nervous system defects, and other physical problems. A friend of mine, an ICU nurse, was deeply concerned for her patients during the Fourth of July when each loud blast caused heart monitors all over the unit to jump. This startle response is well-known and responsible managers of theaters and theme parks now post warnings when fireworks, lights, lasers, and smoke are being used.

Instead of looking at the shortcomings of Professor White's article, I would suggest that the fireworks and pyrotechnic industries look to themselves. They should not wait for some pro-

fessor to write a technically shaky article on fireworks. They should be compiling data on the chemicals they use.

While the total amounts of chemicals used in the fireworks industry is far smaller than many other air-polluting industries, the fireworks industry has no anti-pollution control mechanisms. Essentially the entire output of the fireworks industry is thrown into the air and ignited. And it is almost always done in highly populated areas.

The fireworks and pyrotechnics industries also should study the emissions from pyrotechnic reactions. If they believe they are not a significant source of pollution, they should compile the data to prove it.