Communications

Brief technical articles, comments on prior articles and book reviews

Review of "Pollution Caused by Fireworks"

by Doris Gnauck White,
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"Pollution Caused by Fireworks" appeared as the feature article for the October 1996 issue of *American Environmental Laboratory*. Given the importance of the topic to the pyrotechnic community, the article certainly deserves some mention in the literature.

There is no question that fireworks, like every other human endeavor, cause some pollution. The issue though is not whether fireworks cause pollution but: "How much pollution?" "How serious is that pollution?" and "Is this pollution over a short-term, long-term or both?" Once these questions are answered the next step is to determine what can be done about the pollution.

There are also significant differences in looking at the pollution issues from the production of the raw materials, the actual manufacturing and assembly processes, where workers are regularly exposed to dusts and vapors, and the ultimate use. Each of these in turn must be analyzed, based on the environmental conditions in which these activities take place as well.

The author of this article, Doris G. White, is a Professor of Curriculum and Instruction, Science Education at William Patterson College in Wayne, New Jersey, USA. One expects it to meet the minimum standards for a scientific or academic report and hopefully provide some useful information that helps answer the perennial questions above. Instead, the paper starts out with sweeping generalizations such as "Fireworks constitute a serious international environmental problem that needs to be confronted" and "a major cause of worldwide pollution is fireworks". Prof. White provides no comparisons to "industry and/or agriculture", which she believes "are routinely blamed for the pollution", and fails to even estimate the type, the amount, much less the seriousness of pollution she alleges is caused by fireworks.

According to Prof. White, "Pollution is caused by light, sound, heat, and chemicals", a declaration that is so all encompassing, it is absurd. To classify fireworks effects and their sources as "pollution" totally misses the point why people use them in the first place. It is also a general condemnation of every living endeavor and natural phenomenon.

Prof. White believes that "Since many theme parks explode fireworks nightly, and since fireworks are used for celebrations throughout the world, the public should be informed of their hazards and of the precautions that can be taken to prevent harm". She does not provide any precautions that could be taken or describe how the public could be informed.

This paper is essentially a list of 53 chemicals and substances used, as she says to "concoct" fireworks, and covers aluminum to gunpowder to starch to zinc. Curiously clay is included on the list but paper and cardboard, two of the most common and voluminous components of fireworks are not. She notes in short, choppy sentences some of the appearance, solubility, and history of many of these chemicals while in others she has bits on how the chemicals are made or their places of origin. Some explain the problems of certain combinations, or the handling or processing risks, but not much else. Only a few explain why or how they are (or were used) in fireworks, and none provide any description of the resulting "pollution" once these chemicals are consumed when the fireworks function.

Many of the chemicals on the list are not commonly used in modern fireworks, such as Paris green. Others were rarely, if ever, used

such as Nitroglycerin. Her list is little more than a random collection of notes of unknown origin that do little to support the main premise of the essay.

Prof. White makes no attempt to verify her feeling that "It is distressing to learn that PVC is used in fireworks, because of the fear of dioxins resulting from the burning of PVC". There is nothing to in this article that compares the quantities of these chemicals used in fireworks to the same chemicals used by individuals, agriculture or industry, so the scope of the pollution is in any perspective.

Her assertion that "pollution caused by fireworks should not be blamed on industry or agriculture" falls far short of reality. The total quantity of fireworks used in the USA in 1996, which includes a substantial amount of inert organic material such as paper, cardboard, clay, rice hulls, and so forth, was about 118 million *pounds*.[1, 2] This is in comparison to individuals, agriculture and industry using billions and billions of *tons* of the same materials, meaning fireworks constitutes only a very tiny part of the overall pollution problem.

There has been little scientific research into the issue of pollution caused by fireworks, something that most certainly needs to be addressed. This is especially important for workers in manufacturing facilities that are routinely exposed to the chemicals that go into fireworks, even though these chemicals generally have low toxicity levels.

One specific study of fireworks use analyzed water samples collected over a 10-year period from a virtually fixed lake at a theme park. The lake had nearly 3,000 displays fired over it in 8 of the 10-years; so there were substantially more fireworks used over this one location than most others. The study concluded, "Fireworks activity does not appear to contribute substantially to the eutrophication of water bodies."[3]

While this study is encouraging, it is hardly a comprehensive answer to the overall question of the extent of pollution caused by fireworks. If the fireworks pollution problem is to be addressed, it must first be assessed carefully from the beginning of the manufacturing process to the end use. The extent and seriousness of the pollution need to be determined and solutions on how to reduce or eliminate them need to be detailed. And all of this needs to be done using the scientific method, not value judgements.

Given the academic institution Prof. White represents and the publication's status, one expected an in depth paper that reported on research conducted according to the scientific method. However the 5,000 word article not only does not meet those expectations, it leaves one totally disappointed and seriously questioning the author's true purpose.

References

1) Summary of Trade and Tariff Information - Fireworks (TSUS Item 755.15). U S International Trade Commission, Washington, DC, USA, 1997.

2) "Fireworks Facts and Figures", American Pyrotechnics Assoc. (APA), Chestertown, Maryland, USA, May 1997.

3) T. A. DeBusk, J. J. Kaeffaber, B. R. Schwegler, Jr., J. Repoff, "Environmental Effects of Fireworks on Bodies of Water", *Proc. 1st Int'l Symposium on Fireworks*, CANMET, Ottawa, Canada, 1992.