The environmental impact of fireworks

The possible environmental impact of fireworks has become a hot topic in recent years. The good news is that firework displays contribute little to any of the three major areas of concern: carbon emissions, toxic gas and particulates emissions, and chemical contamination.

The British Pyrotechnists Association have commissioned studies on the environmental effects of fireworks and has worked closely with experts in the field to quantify and explain the SCIENCE behind many of the alarmist claims made by those who wish to ban fireworks completely.

The information provided by some opposed to the use of fireworks is unscientific and misleading. For instance this graphic showing potential contaminants has many chemicals that simply are not present in fireworks, or more importantly their combustion by-products.

Fireworks are made from a mixture of oxidants, fuels and additives which react to produce combustion by-products.

It is that combustion of the chemicals inside the firework is what leads to the colour and effects we all love. Such combustion by products include:

- Carbon dioxide, nitrogen and sulphur oxides
- Soluble and insoluble solid metal oxides and salts

The BPA has analysed the typical output of these combustion by-products for 3 sizes of displays.

- **A typical small wedding or village display** of about 50kg Net Explosive Content (NEC) where the carbon, nitrogen and sulphur oxides produced represents only about one 50th of that produced by people using transport to get to the displays
- **A typical medium town or concert display** of about 250kg NEC that equates to one hundredth of that by people travelling to the display
- **A typical large display, such as London New Year** of about 1000kg NEC that equates to one three-hundredth of that by people travelling to the display

Furthermore where a firework display is accompanied by a traditional bonfire the bonfire itself contributes between 10 and 1000 times the carbon gasses produced by the display.

Two studies (one at Disney and one in Hong Kong - which stage major firework displays frequently – daily in the case of Disney) have examined the effect of firework displays on the flora and fauna at the display site and have found no adverse effects. However, and rightly, the industry remains committed to reducing the possible environmental impact of fireworks.

Overall, the adverse environmental effects of fireworks are very low. The combustion by-products from a display are widely dispersed and most of them are biologically benign. There are many more sources of pollutants such as CO_2 from the travel of spectators to a display, running generators for lighting, food outlets and even the CO_2 produced by the audience "breathing". Don't be fooled by fanatical claims – always follow the science!

For more information consult your display company – or the BPA Direct

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Fireworks and noise – a scientific analysis

Firework displays always produce a certain amount of noise – whether that be from propelling effects into the sky and bursting them, or deliberate noise such as whistles, hummers and crackles.

A SILENT FIREWOK DISPLAY IS AN IMPOSSIBILITY

Of course, it is possible to design and fire LOWER noise displays – by careful choice of fireworks that are appropriate for the venue and the audience. However recent press reports and surveys have indicated that the majority of those people attending a professionally fired display enjoy the sense of noise as well of colour and some sites have reverted to "normal" displays after trialling lower noise ones.

It is important to appreciate that the sound level you perceive from any firework is dependent on the distance you away from that firework – the greater the distance the less the sound level (this is known as the inverse square law). If you see a sound level quoted without the distance at which it is measured the value is meaningless.

120dB is the maximum sound level permitted at the minimum viewing distance for fireworks available to the public. However at a display it is rare that this distance is the actual distance the audience are located, and the sound level is far from continuous. So at the following distances the sound level is approximately (and it does depend on factors such as wind and environment) - 116dB at 32m, 112dB at 50m and 108dB at 80m.

However, as a comparison (and using figures widely quoted – mostly without distances cited):-

- 90dB (a figure often suggested by anti-firework activists) is approximately the noise level of a hair-dryer – presumably measured within 0.5m of the ear and also the typical sound level of a petrol lawnmower – measured at 1m
- 115dB is the typical sound level of a cheer at a large sporting event measured on the pitch
- 120dB is approximately the sound level of a police car siren – measured, we presume at the kerbside of a road or the typical sound level for a rock concert – for the duration of that concert

Discuss the type of display with your contractor and identify:-

- Identify local areas of concern – you have the local knowledge
- Consider an earlier display when light levels allow it
- Inform your neighbours

Animals that might be affected by fireworks are generally only affected at the start of the display and there is good advice from animal charities such as playing increasingly loud videos of fireworks (YouTube for instance) to domestic pets before the display or music to horses to mask the break between silence and noise. Ther are also sensible actions that can be taken for skittish pets, such as specifically designed sedatives and comfort blankets – but, importantly, if you have a particularly distressed pet don't leave it alone!

We know that wildlife such as ducks react to the first firework as they would, say, to a shotgun being fired – but are usually back on the lake a few minutes into the display.

There are sensible precautions that animal owners can take to reduce the effect on their pets, but display organisers and contractors also have a role to place to ensure the right fireworks are being used, fired at the right time, and that people are aware.

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