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# In the firing line

By Bryant Furlow

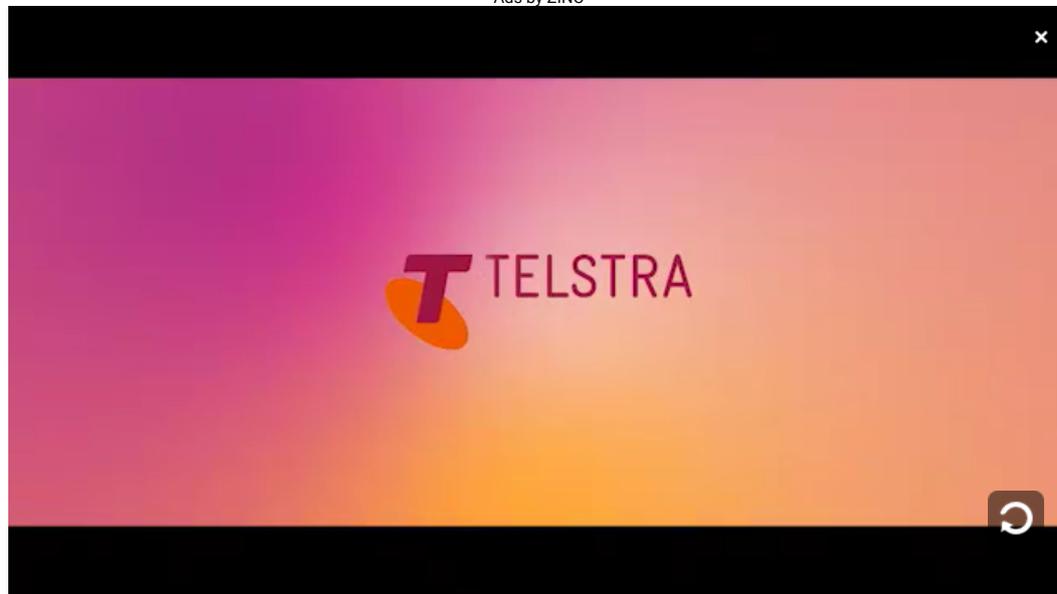
A senator has demanded that the US Navy hand over documents that could reveal if a link exists between a military fuel and a cluster of 14 childhood leukaemia cases near a naval airbase in Nevada.

Concerns about health risks have mounted since the fuel, called JP-8, was introduced to American airbases in the 1990s after trials in Britain in the 1980s. Animal tests have shown that it can cause lung, kidney and liver damage, and is highly toxic to the immune system. The Pentagon has even commissioned studies to determine whether JP-8 exposure contributed to Gulf War syndrome.

Now Harry Reid, a senator for Nevada, has filed formal requests to the Navy, the federal Office of Pipeline Safety and pipeline company Kinder Morgan to disclose records related to JP-8 leaks and spills around the airbase in Fallon, Nevada. "When we talk about causes of the leukaemia cluster, jet fuel is the number one thing mentioned," says Reid.

JP-8 consists of a complex mixture of hydrocarbons, including polyaromatic hydrocarbons (PAHs) and benzene, a known carcinogen. Its low freezing point means it can be used in all climates. The Pentagon sees JP-8 as a "universal battlefield fuel" for NATO, capable of powering trucks, tanks and even infantry stoves as well as planes.

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But military personnel and people living near airbases can be exposed to a superfine mist, or aerosol, of unburnt JP-8 produced as a plane's engines warm up before and during takeoff. In breath tests for PAHs, all airbase personnel studied have tested positive for JP-8 exposure. Animal studies have shown that inhaling JP-8 increases lung permeability and can damage the DNA of lung and liver cells—and thus potentially cause cancer (**New Scientist**, 28 March 1998, p 6).

Recent research has also shown that it is extremely toxic to the immune system. Mark Witten, a toxicologist at the University of Arizona, Tucson, whose work is funded by the US Air Force, was astounded by what JP-8 does to mice that inhale it. "It's just wrecking their immune systems," he says. "I've never seen a chemical that can so completely wipe out an animal's defences."

Part of the problem with JP-8 is that it doesn't readily evaporate, so it's more likely to soak into the skin and lungs. What's more, there's some evidence that the performance-enhancing additives in the fuel disrupt the molecular arrangement of the outermost layer of skin, poking holes in the body's main barrier against alien chemicals.

Even after brief exposure, the number of immune T cells in mice plummet and their thymus (where immune cells mature) shrinks, while B cells proliferate. So severe and sustained are the effects that Witten and his colleague David Harris, also at the University of Arizona, worry that repeated exposure could increase the risk of autoimmune diseases and cancer, especially in the presence of other risk factors such as pesticides.

Witten is now studying whether JP-8 causes breaks in DNA strands in the animals' bone marrow cells, potentially triggering leukaemia. It's already known that the children of parents who are exposed to hydrocarbons at work have a greater risk of developing acute lymphoblastic leukaemia – the type of childhood leukaemia in 13 of the 14 confirmed cases in Fallon. "My nightmare scenario is that there are fifty other clusters like Fallon out there," says Witten.

The effects of exposure to aerosols and spills on children and pregnant women have yet to be studied. But when pregnant mice are exposed, Harris recently discovered, up to 70 per cent of offspring die and surviving pups have abnormal white blood cells.

The US Navy vigorously denies that JP-8 poses any risk. But leukaemia experts such as Peter Domer of the University of Chicago agree that Witten's concerns are well founded. Hydrocarbons in JP-8 such as naphthalene or benzene are capable of causing the sorts of genetic damage seen in childhood leukaemia, Domer says.

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