

# 4F Dangers from Lead

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## Lead in the 20<sup>th</sup> Century

The rise in the number of cars has contributed hugely to the demand for lead. The lead-acid battery can produce a rapid surge of power, and is easily re-charged, making it ideal for starting car engines. The lead makes up about 60% of the weight of a typical car battery. Today nearly all car batteries are recycled so the lead does not produce an environmental hazard. This is the main use of lead today as substitutes have been found for lead for many other applications.

## Lead in Petrol

The infamous association of lead with cars arose from the use of a lead compound, Tetra-ethyl Lead, as an additive to petrol. Petrol consists of hydrocarbons, that is, compounds in which carbon and hydrogen are bonded together. Tetra-ethyl Lead is a hydrocarbon which also contains lead.

If engines are run on poor quality fuel, more like paraffin than petrol, the fuel burns unevenly and some may ignite early, causing the engine to 'knock'. In the USA a chemist working for General Motors discovered that Tetra-ethyl Lead would give petrol the required anti-knock properties. General Motors patented the use of the additive, calling their fuel 'Ethyl Gasoline' in order to disguise the fact that it contained lead. The manufacturers managed to convince the American government that at the low concentrations required in petrol it was no more dangerous than the fuel without the lead additive, and it was widely used.

The danger was real, and the inventor of the petrol additive, Thomas Midgley, was amongst those who died of lead poisoning.

The resulting build-up of lead in the atmosphere was first discovered by accident. Clair Patterson was trying to discover the age of the earth by determining how much uranium in ancient rocks had decayed to lead over hundreds of millions of years. His initial results were inaccurate because of lead in the environment, and he had to work in a completely clean room where this contamination was eliminated. He soon appreciated that researching atmospheric lead pollution was a much more important task than discovering the age of the earth, and he became one of the leading campaigners against the use of lead in petrol. He examined ice cores from Greenland which preserved the record of the rise in atmospheric lead pollution. Clearly the contamination was worldwide.

Matters came to a head when the United States Environmental Protection Agency began to phase out lead in petrol, and was sued by the manufacturers of Tetra-ethyl Lead. The manufacturers lost the case, and the ban on lead in fuel is now virtually worldwide. The effects of the ban have been dramatic. A study on lead levels in blood of Americans showed a 78% drop between 1976 and 1991. A research paper presented in 1993 in honour of Clair Patterson concluded 'Human activity has led to an increase in lead concentrations during recent centuries both in Antarctica (tenfold increase) and in Greenland (two hundredfold increase). This last increase was followed by a 7.5-fold decrease during the past two decades, mainly as a consequence of the rapid fall in the use of lead alkyl additives in the USA as confirmed by recent isotopic data.'

## Lead Poisoning

Lead poisoning is one of the oldest known dangers. It is now appreciated that there is no level of lead contamination which is safe, and that children are most at risk because of the damage it can do to their developing nervous systems. Paralysis and brain disorders had been known to result from lead poisoning even in Roman times. Miners and smelter workers were particularly affected, but also the families who lived near smelters, or animals in fields nearby.

As early as 1700 the use of Lead Acetate to sweeten wines was banned, though in the absence of rigorous testing, lead was still added, and this is believed to have contributed to the death of the composer Beethoven. Similar problems resulted from the making of cider in lead presses, and the symptoms which resulted from poisoning were named 'Devonshire cholera'.

Lead in paint remains a significant danger, even though its use is banned. Burning off old paint can expose people to lead poisoning, and flakes of old lead paint are harmful to health. In 2007 the toy firms Fischer-Price and Mattel had to recall millions of painted children's toys produced in China after lead was discovered in the paint.

The use of lead shot has proved dangerous to wildlife, and not just to the pheasant that are shot! Pellets which drop into water can be shovelled up by feeding birds such as ducks and swans, which also pick up the lead weights lost by fishermen. For this reason lead free shot and weights are now used wherever possible.

Lead pipes for carrying water might appear to have been hazardous to health, but were generally quite safe. This is because in most places the natural hardness in the water produces a deposit of lime around the inside of the pipe. After a few years the water does not actually come into contact with lead. Also, if water is flowing through the pipe, it has little time in which to absorb lead. The only danger arises if the water which had been standing in the pipe is drunk. A particular problem was presented by lead pipes in public houses where beer was pumped from a cellar. The usual practice was to pour away the beer which had remained in the pipes overnight, as it would be flat and unpalatable.

## Does Lead present a danger at Snailbeach?

The government, realising the dangers presented by old industrial sites, gave local authorities the responsibility of making them safe. Shropshire County Council now own the former mine at Snailbeach. They carried out extensive works at Snailbeach in the 1990s to make the site safe both for residents of the village and for visitors to both the site, and to the nearby area of Outstanding Natural Beauty. This included

- Finding and sealing off all entrances to old mine workings
- Removing any dangerous chemicals or contamination
- Stabilising the old mine tips so that landslides will not be caused, and covering them with grass.

Since the danger is now so well known, areas that are known sources of lead contamination such as old mines, smelters and tips are checked to assess the level of danger and sealed off if unsafe. At Snailbeach is very many years since lead was last smelted, and the miners were, for economic reasons, anxious to ensure that as much of the Galena as possible was used rather than being

discarded. The Smelt House, where Galena was smelted to produce lead, was about a mile north west of the main site, and is on private land. It was largely demolished after it was closed in 1895 and is not included in the visit to Snailbeach. It was connected to a chimney on Resting Hill by a flue which was over a mile long. The purpose of the flue was to collect as much lead as possible from the fumes of the smelter, and the deposits were regularly collected. When the smelter was closed most of the flue, with its dangerous yet valuable contents, was removed.

Lead mining at Snailbeach ceased in 1911. The horizontal tunnel known as Perkins Level which can be visited today was worked later for Barytes, and very little Galena remained unworked here.