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Lead poisoning of Port Pirie children: a long history of looking the other way

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Unsafe: thousands of Port Pirie children have been poisoned over decades, and yet government after government fails to stop it. Flickr/Viola Ng

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It is shocking to discover that more than 3000 children have been lead poisoned in the South Australian town of Port Pirie during the last decade.

Whilst Australia continues to be a world leader in lead mining, smelting, and processing, the adverse impacts associated with production have been consistently downplayed by industry, governments, councils, health officials, and regulators. Even some academics argue the effects of low lead exposures are not of significant concern. Due to ignorance, misinformation, and deliberate obfuscation of evidence, generations of families living next to lead-mining, smelting, and refining centres such as those in Broken Hill, Port Pirie, and Mount Isa, have been and continue to be exposed to environmental lead, a known neuro-toxic contaminant.

More than a century of IQ-lowering poisoning continues

Childhood exposure to lead has been linked to lower IQ and academic achievement, and to a range of socio-behavioural problems such as attention deficit hyperactivity disorder (ADHD), learning difficulties, oppositional/conduct disorders, and delinquency. The disabling mental health issues from lead exposure often persist into adolescence and adulthood.

Port Pirie has been affected by lead-smelting emissions for over 120 years. A 1925 South Australian

Royal Commission on Plumbism (lead poisoning) identified that the principle cause of poisoning was fine lead dust. Government officials had argued in the 1980s and 1990s that historical lead-smelter dust-emissions held in the city's soils and home environments were the primary cause of elevated blood lead in children (Body et al., 1991). Indeed, they are still arguing that this is the case:

> *The Government understands there are legacy issues at Nyrstar's plant at Port Pirie and has been working with all parties for many years to come to a solution.*

Examination of the published research and the data collected by South Australia's Environment Protection Authority (lead-in-air measurements) and SA Health (blood lead measures in children aged 0-4 years) shows that the contemporary and historical lead-in-air emissions are the primary causes of elevated blood-lead levels in Port Pirie children.

Local independent MP not facing facts

Despite the overwhelming evidence available in publicly accessible documents, it is staggering to read that the town's Independent state MP, Geoff Brock, has not been accurately briefed on the matter. Mr Brock says Port Pirie does not deserve its negative image:

> *"I think it is unwarranted, quite frankly," he said. "We have got that stigma of, I call it a polluted city, and we are not a polluted city. It is an inherited issue through the lead smelter over many, many years."*

Mr Brock's comments are the same line of argument that has been plied for decades – in effect, he is arguing that historical lead emissions are causing elevated blood-lead problems in Port Pirie and that it is not a contaminated town.

That line of argument is inconsistent with the evidence. The "legacy" argument has delayed effective action over the last three decades and the current commentary coming from government suggests that there is a real risk that the primary cause of the problem will not get addressed. But with the potential for change at the smelter, this is a golden opportunity to clean up Port Pirie properly and effectively.

Contaminated playgrounds

As part of a 2011 lead exposure research study at Port Pirie, 26 surface soils (0-2 cm) at air monitoring and playground sites were sampled. Our samples had an average lead value of 1442 mg/kg, (approximately 38 times above background) confirming that surface soils are contaminated and also present a serious risk of harm to the children. The focus of our study was dust-lead exposure at four children's playgrounds in Port Pirie (Memorial Park, Foreshore Park, Sports Park, and Woodward Park (see figure 1).

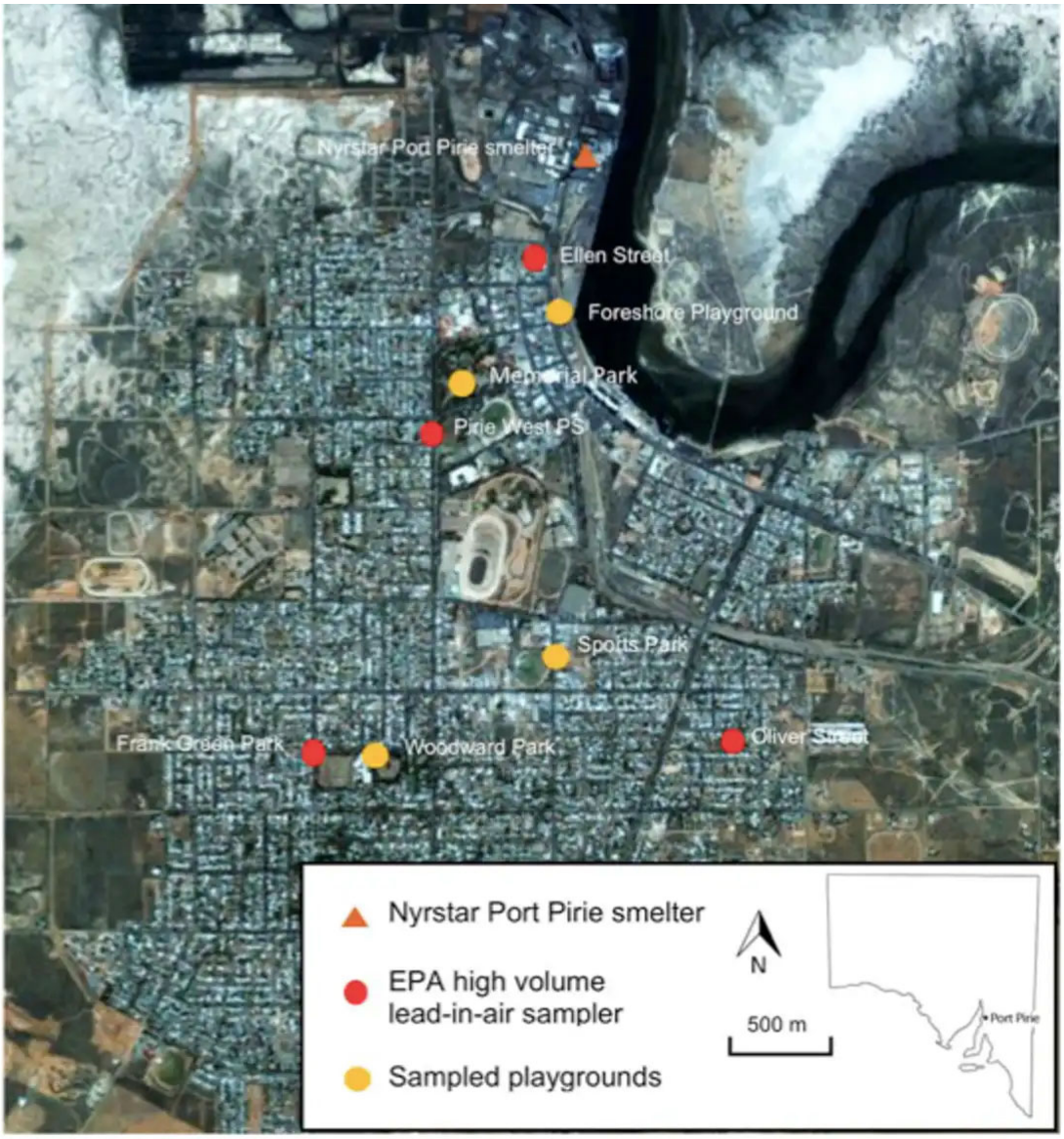


Figure 1: map of Port Pirie with EPA lead-in-air sample sites and playgrounds marked. The Port Pirie smelter is located at the north of the town. Image taken from Google Maps

Muliple dust-wipes collected daily from surfaces at four Port Pirie playgrounds returned average lead values of 3286 µg/m2, compared to 18.9 µg/m2 at a control playground at Port Augusta, 85 kilometres to the north. The Port Pirie values exceeded the Western Australia (WA) Health lead-level of 400 µg/m2, which was applied as a goal for surfaces accessible to children as part of the recent Esperance lead clean up program.

We also collected hand wipes before and after 20 minutes of timed play at each playground. Hand lead is of greater concern because young children tend to put their hands in their mouths, and it is therefore a significant pathway for childhood lead exposure. Memorial Park playground, the playground closest to the smelter that we sampled (figure 1), returned the highest lead-loadings after 20 minutes of play, with a daily mean increase of approximately 18,158 µg/m2. Overall, approximately 95% of all post-play hand-wipe samples from Port Pirie playgrounds exceeded the WA Health clean up goal of 400 µg/m2. By contrast, no samples from the control playground at Port Augusta exceeded the lead goal.

We have also examined the relationship between lead-in-air at the time of the study and our dust measurements. The data show that for each 1% increase in air lead (µg/m3), surface dust loading at playground sites increased by 0.713%. In addition, for each 1% increase in air-lead the post-play lead on hands increased by 0.612%. Thus, the evidence shows that airborne lead is significantly contaminating playgrounds.

These findings are not dissimilar to previous studies completed in Port Pirie that have shown that atmospheric emissions are the primary source of lead exposure. Therefore, it is misleading and a gross over-simplification to argue that the lead problem in Port Pirie is caused by legacy effects, without reference to the ongoing smelter-emissions.

As far back as 1976, the CSIRO demonstrated that the smelter had contaminated soils, grains, and vegetables around the Port Pirie area. A further CSIRO study in 1981 confirmed the negative impact of smelter emissions on environmental quality around Port Pirie. In 2004, Crikey reported that grain from the Port Pirie area had to be blended because cadmium and lead levels exceeded internationally accepted standards.

The impact of the smelter can also be understood by examining [SA Health's blood-lead monitoring of children](http://www.sahealth.sa.gov.au/wps/wcm/connect/51cd28804a5ce70dbf57ff7633bbffe0/TechnicalPaper-PHCS-SS-2011.pdf?MOD=AJPERES&CACHEID=51cd28804a5ce70dbf57ff7633bbffe0](http://www.sahealth.sa.gov.au/wps/wcm/connect/51cd28804a5ce70dbf57ff7633bbffe0/TechnicalPaper-PHCS-SS-2011.pdf?MOD=AJPERES&CACHEID=51cd28804a5ce70dbf57ff7633bbffe0). This monitoring data shows that in 2011, 25.5% of children (excluding the use of surrogate values) under 5 years-of-age have elevated blood-lead values, i.e. more than 10 µg/dL - the Australian national goal for blood lead in children.

Even though children are born with relatively low blood-lead levels (predominantly well below 5 µg/dL), research shows that blood leads rise rapidly from 2 to 3 months of age, demonstrating that infants cannot escape the environmental lead emissions. At this age, children would not have been crawling and would have been lying in their bed, receiving lead-dust on their hands, face, clothes, and cot.

By the time children are 24-months-old, the geometric mean blood lead level is 6.1 µg/dL, which is beyond the level at which the US National Toxicology Program identified multiple adverse health effects in children. Indeed, in May 2012, the US Centers for Disease Control and Prevention lowered their action threshold blood-lead to 5.0 µg/dL after accepting the weight of evidence for no safe threshold and the need to intervene much earlier to limit damage to children.

The most lead-contaminated town in Australia

The EPA's 2010 air quality raw data shows that the city is blanketed regularly in elevated lead in air emissions. These emissions contaminate the whole town, its soils, exterior and

Port Pirie's CBD, with the lead-smelter's chimney overlooking the town.
Flickr/Royston Rascals

interior surfaces, and then children's hands. National air quality data shows that Port Pirie is unequivocally the most lead-contaminated urban environment in Australia. Another health pollutant, sulfur dioxide, exceeded the national 1-hour standard 44 times in 2010. Sulfur dioxide affects respiratory conditions, such as asthma. Childhood blood-lead exposures are more than twice those recorded anywhere else in Australia - higher than Broken Hill or Mount Isa. While these are uncomfortable facts, especially for young families in the city, they need to know the truth so that they can make fully informed choices.

While government knows the truth, the public wait for effective action

It is also clear that there has been and continues to be significant government knowledge of the true nature and extent of the problem. The fact that the politicians have not acted on the evidence demonstrates they have ignored the information coming from their staff, and/or have not had the willpower or commitment over the last 30 years to take effective action to eliminate preventable and damaging exposures once and for all. In 1983 Dr Phillip Landrigan, a world-renowned paediatrician called for urgent action in his report that was commissioned by the then-health minister. He identified that airborne lead and its accidental ingestion from atmospherically contaminated dust and soil were the main sources of exposure.

While it acknowledged that some useful work was undertaken by the Task Force set up in 1983 to deal with the problem and tens of millions of dollars have been spent, the tenby10 goal of reducing blood lead levels of 95% of children up to the age of four to below 10 µg/dL by the end of 2010 failed.

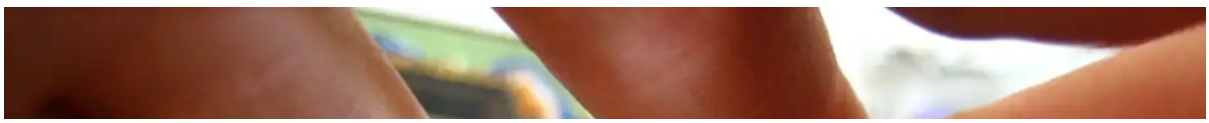
It has failed because the clean-up of household dusts and soils was incomplete and, more importantly, the primary source for lead exposure - smelter emissions - was not eliminated. As a result, businesses, houses, playgrounds, schools, and outdoor areas have been further contaminated.

Residents advised to protect themselves

Residents are advised to protect themselves in their homes by washing hands, surfaces and food and to not transport in dust and soil from outside. This approach is problematic for two reasons:

(1) A recent review of household interventions for preventing domestic lead exposure in children finds that household interventions do not work;

(2) Asking home owners to protect themselves from a seriously polluting industry instead of implementing complete or more effective emission capture is simply inappropriate and unreasonable.



Telling people to wash their hands is not good enough. Flickr/firexbrat

Lead pollution still pouring from the smelter

Due to a lack of adequate action to limit or eliminate Port Pirie's significant smelter emissions (44,000 tonnes of lead into the air in 2011), lead-rich particulates continue to contaminate indoor and outdoor surfaces, and soils, as well as the atmosphere. As a result, blood-lead poisoning is almost an inevitability for residents of the city, especially children.

The only conclusion one can draw from the failure to eliminate preventable lead exposure in Port Pirie is that there has been an absence of decisive and competent leadership from successive governments over the last 30 years.

In order to break the cycle of exposure and poisoning there needs to be a quantum shift in the approach to the problem at Port Pirie, including more transparent and accurate reporting. Solutions might entail smelter closure or perhaps, as is being suggested, a refit with modern, clean technology coupled to comprehensive soil and household dust remediation across the city. Both treatments are required to reduce exposures significantly.

Preventable, elevated blood lead values are unacceptable for any child. The source and extent of the problem in Port Pirie have been established and the solutions are well known to industry professionals. The unanswered question is whether the South Australian government is going to resolve this problem finally or if they will fold once again because of the fear of losing the industry and jobs.

Comments welcome below.

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