LETTER

Australians are not equally protected from industrial air pollution

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Abstract

Australian air pollution standards are set at national and state levels for a number of chemicals harmful to human health. However, these standards do not need to be met when ad hoc pollution licences are issued by state environment agencies. This situation results in a highly unequal distribution of air pollution between towns and cities, and across the country. This paper examines these pollution regulations through two case studies, specifically considering the ability of the regulatory regime to protect human health from lead and sulphur dioxide pollution in the communities located around smelters. It also considers how the proposed National Clean Air Agreement, once enacted, might serve to reduce this pollution equity problem. Through the case studies we show that there are at least three discrete concerns relating to the current licencing system. They are: non-onerous emission thresholds for polluting industry; temporal averaging thresholds masking emission spikes; and ineffective penalties for breaching licence agreements. In conclusion, we propose a set of new, legally-binding national minimum standards for industrial air pollutants must be developed and enforced, which can only be modified by more (not less) stringent state licence arrangements.

1. Introduction

It is very difficult for individuals to control the extent to which they are exposed to air pollution, especially those living close to polluting industrial facilities, such as smelters, which are a major source of air pollution in Australia (NPI 2013). Therefore it is necessary that comprehensive, clear and enforceable air quality standards are put in place to protect the health of all Australians from point source emissions, regardless of their place of residence. Unfortunately, unlike many other countries, such standards do not currently exist in Australia. Indeed, the regulation of air pollution in this country is complex and confusing, and tends to be based on ambient air pollution levels and average pollutant concentrations over certain time periods. This approach (although perhaps appropriate to address diffuse source air pollution such as that from traffic) ignores the direct, and localized, impacts of point source pollution and is largely ineffective in its role of protecting the health of people, especially those living in proximity to highly polluting industrial facilities.

1.1. Current Australian air pollution standards

In Australia, each state and territory has its own laws and policies governing the levels at which certain pollutants can be emitted. This remains the case, despite the fact that national standards for air pollution exist, set by the National Environment Protection Council (NEPC)³. The NEPC was charged with making National Environment Protection Measures (NEPM), and has the goal of ensuring that all Australians enjoy equal protection from environmental pollution. It was also the goal of the NEPC that the NEPMs should become binding in each state and territory. Whilst the states and territories have all enacted legislation indicating this intention⁴, there is no legal obligation to transform this intention into reality.

³ It should be noted that on 13 December 2013, the body under which the NEPC sat, the Standing Council on Environment and Water, was revoked by the Commonwealth Government. To date, no replacement body has been established and no clear indication has been given as to how the work of the NEPC will continue in the future.

⁴ See for example, section 7, National Environment Protection Council (New South Wales) Act 1995 (New South Wales).
Table 1. Recorded prosecutions in relation to air pollution by NSW EPA.

| Date           | Offender                          | Details of offence                                                        | Section of act | Fine          |
|----------------|-----------------------------------|---------------------------------------------------------------------------|----------------|---------------|
| 2 August 2001  | Port Kembla Copper Pty Ltd         | Emissions of sulphur dioxide to air in excess of limits set by conditions of environmental licence authorizing operation of copper smelter, resulting in harm to environment. | 64(1)          | $116 000      |
| 17 December 2004 | S J Perry                         | Negligent disposal of tires in such a manner as to potentially cause air pollution through fire. | 115            | $30 000       |
| 30 June 2006   | Caltex Refineries (NSW) Pty Limited | Failure to operate plant in a proper and efficient manner so as to cause air pollution (odors). | 124(b)         | $81 311       |
| 23 October 2009 | George Ghossayn                   | Operation of landfill facility without lawful authority; dealing with materials (landfill waste) in a manner causing air pollution (through smoke and odors). | 126            | $50 000       |
| 31 May 2010    | Transpacific Industries Pty Limited/Transpacific Refiners Pty Limited | Emission of volatile organic compound to air in excess of limits prescribed by environmental licence authorizing chemical production. | 64(1)          | $30 250       |
| 3 August 2011  | Unomedical Pty Limited            | Failure to prevent emission of air impurity (ethylene oxide) whilst carrying out activity of sterilising medical equipment, where no emission standards set under legislation. | 128(2)         | $90 000       |

* Protection of the Environment Operations Act 1997 (New South Wales).

The Ambient Air Quality National Environment Protection Measure (AAQNEPM) sets standards for carbon monoxide, nitrogen dioxide, photochemical oxidants (such as ozone), sulphur dioxide, lead and coarse particulates. It requires monitoring stations to be installed in areas with populations greater than 25 000. This population threshold is set at a level that is too high to require monitoring at many significant point sources of air pollution, such as smelters and mining facilities. Consequently, state and territory governments retain significant discretion as to how, and to what extent, the AAQNEPM standards are implemented.

1.2. State and territory regulations

Due to its non-binding nature, there has been no clear adoption of AAQNEPM standards. Rather, they have been incorporated to varying extents using a variety of different methods by state and territory authorities. In some states, the AAQNEPM has been implemented through a combination of existing and new environmental laws, whereas others have created environmental policies for this purpose. The complexity of these arrangements and the uncertainty surrounding the legal status of the instruments in which the standards are contained (such as policy documents), means that the AAQNEPM standards are largely unenforced (ANEDO 2013). In the absence of the AAQNEPM, there is no easily identifiable legal framework regarding the regulation of air pollution (ANEDO 2013). This is of significant concern, because it means that existing ill-defined and overlapping regulatory frameworks that relate to air quality and public health provide incomplete and varying levels of protection to people living in different parts of the country.

In most states and territories, pollution is broadly regulated through pieces of environmental legislation containing provisions that create a general duty not to harm the environment. It is a general defence to these types of offences if the environmental harm was caused with lawful authority, for example, in accordance with the terms of a licence granted to carry out a particular industrial activity. Only the most acute acts of air pollution are likely to be caught by these provisions though, with a chronic pollution burden unlikely to trigger an environmental agency response. The infrequency of regulatory action in the state of New South Wales (NSW), the largest by population in Australia, in relation to air pollution incidents and breaches of pollution licences issued to industrial facilities to allow them to carry out polluting activities, provides a good example of this phenomenon. This can be seen through the comparison of tables 1 and 2(a) and (b) which identify, respectively, the small number of prosecutions carried out by the NSW Environmental Protection Agency (NSW EPA) since the commencement of the NSW Protection of the Environment Operations Act 1997 (POEO Act) in relation to air pollution offences and the quantum of the penalties issued; and the high number of breaches of pollution licence conditions for two major smelter operations in NSW.

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5 See for example, the Environment Protection (Air Quality) Policy 1994 (South Australia).

6 See for example, section 155, Protection of the Environment Operations Act 1997 (New South Wales); section 25, Environment Protection Act 1993 (South Australia); section 50, Environmental Management Pollution Control Act 1994 (Tasmania).

7 For more information on pollution licences see section 1.3 below.
### Table 2.

(a) Licence breaches at Broken Hill, NSW.

| Year (FY end) | No. of breaches | Types of breach | Action |
|---------------|-----------------|-----------------|--------|
| 2000          | 2               | (M2) Dust monitoring | No data. |
| 2001          | 1               | (M2) Dust monitoring | No data. |
| 2002          | 1               | (M2) Dust monitoring | No data. |
| 2003          | 1               | (M2.1) Air Monitoring | No data. |
| 2004          | 14              | (M2.1) Air Monitoring; (L6.1) Blast pressure exceeded. | EPA monitored; investigated non-compliance; 2 prosecutions re blast pressure (total fines of $10 800) |
| 2005          | 3               | (M2.1) Dust monitoring | Action by licensee. |
| 2006          | 10              | (M2) Air Monitoring | Action by licensee. |
| 2007          | 16              | Sampling/monitoring | Action by licensee. |
| 2008          | 15              | (M2) Dust monitoring; (M7.2) Blast monitoring; (L6.1) Blast pressure exceeded. | Action by licensee. |
| 2009          | 10              | (M2) Air Monitoring; (M7.2) Blast monitoring. | Action by licensee. |
| 2010          | 7               | (M2.1) Air Monitoring | Action by licensee. |
| 2011          | 7               | (M2.1) Air Monitoring | Action by licensee. |
| 2012          | 1               | (M2.2) Dust and lead air monitoring | EPA investigated. |
| 2013          | 1               | (M2.2) Air Monitoring | Action by licensee. |
| **Total**     | **89 Breaches** |                  | —5 actions by EPA |

Perilya Broken Hill Ltd, South Operations—EPL 2688

| Year (FY end) | No. of breaches | Types of breach | Action |
|---------------|-----------------|-----------------|--------|
| 2000          | 4               | (M2.1) Air/water monitoring; (L4.1) water discharge limits exceeded; (G2.1) signage. | No data. |
| 2001          | 18              | (L6.1) Blast vibration exceeded; (M2.1) Dust, air, water, vibration monitoring | Prosecution re blast vibration (fined $2000) |
| 2002          | 15              | (M2.1) air monitoring; (M7.1) vibrations monitoring | No data. |
| 2003          | 2               | (M2.1, M6.1) air and discharge monitoring. | No data. |
| 2004          | 7               | (M2.1, M6.1) air monitoring; vibration monitoring. | EPA monitored; investigated non-compliance. |
| 2005          | 9               | (M2.1) air monitoring. | Action by licensee. |
| 2006          | 14              | (M2) air monitoring. | Action by licensee. |
| 2007          | 4               | (M2) air monitoring. | Action by licensee. |
| 2008          | 11              | (M2) Dust monitoring; (L3, L3.4) discharge limits exceeded. | Action by licensee. |
| 2009          | 14              | (M2, M2.1, M7) Air monitoring. | Action by licensee. |
| 2010          | 14              | (M2.1) Air monitoring; (L3.1) Discharge limits exceeded. | Action by licensee. |
| 2011          | 33              | (M2.1) Air monitoring; (L4.1, L3.1, L3.4) water discharge limits exceeded. | EPA advised licensee of action required. |
| 2012          | 15              | (M2.2, M6.1) Air, water monitoring; (L2.4) lead, zinc, cadmium water discharge limits exceeded. | EPA monitored. Pollution Reduction Plan to address non-compliance. |
| 2013          | 31              | (M2.2, M2.3) Monitoring; (L2.4, L2.5, L3.1) Water discharge limits exceeded. | Pollution Reduction Plan to address non-compliance. |
| **Total**     | **191 breaches** |                  | —5 actions by EPA. |

Combined Total—Broken Hill Operations 280 breaches—10 EPA actions

(b) Licence breaches at Cockle Creek, NSW.

| Year (FY end) | No. of breaches | Types of breach | Action |
|---------------|-----------------|-----------------|--------|
| 2001          | 29              | (M2.1, M3) Air, water monitoring; (O1) fugitive emissions, molten lead breakout; (W3.1) exceed water discharge limits; (P2) fail to upgrade stormwater plant; (L2.1) air/water limits exceeded; (L3.7) effluent limit discharge; (L3.8) Non dilution of effluent. | Prosecution re mercury in water discharge limits (fined $33 000). |
| 2002          | 15              |                 | No data. |
Table 2. (Continued.)

| Year | Breaches | Description |
|------|----------|-------------|
| 2003 | 31       | (M2.5) Monitoring; (L3.7) Emission/discharge limits; (PRP) fail to comply with Pollution Reduction Program. |
| 2004 | 29       | (M2.1) Monitoring; (PRP) fail to comply with Pollution Reduction Program. |
| 2005 | 15       | (M2.1, M2) Sampling failures. |
| 2006 | 9        | (M2.1) Sampling. |
| 2007 | 2        | (M2.1) Sampling. |
| 2008 | 22       | (M2.1) Sampling. |
| 2009 | 69       | (M2) Discharge monitoring; (L2, L3) Faulty sampling, discharge limits exceed. |
| 2010 | 6        | (M2.1) Air monitoring. |
| 2011 | 5        | (M2) Inadequate sampling; (L3) Cadmium limit exceeded. |
| 2012 | 39       | (M2.1) PM10 monitoring; (L3, L3.4, L4.1) Mercury and Arsenic total load values exceeded. |
| 2013 | 17       | (M2.2, M2.3) Monitoring; (L1.1, L3) Discharge limits; untreated discharge. |
| Total | 288 Breaches—20 EPA actions. |

4 Following the decommissioning of the smelter, EPL No. 5042 was issued in 2007 as a variation to the smelter’s previous licence, which applied to the operation of the smelter. The variation changed the scheduled activity to ‘Waste Activities’ and ‘Waste Facilities—HIGAB processing’. The licence was subsequently revised and re-issued in 2009 and 2010, when the scheduled activity was changed to ‘Waste storage; Waste disposal (application to land)’.

(Broken Hill and Cockle Creek)

and (M2.1, M3.1) monitoring; (L3.7, L3.8) Exceed effluent limits; (PRP02) fail to comply with Pollution Reduction Program.

Prosecution re failure to comply with PRP (remediate slag dumps). Court ordered slag piles be covered (no fine issued).

No data.

Action by licensee.

Action by licensee.

Action by licensee.

EPA to monitor future compliance; Licence under review (9 Actions).

EPA to monitor future compliance.

EPA to monitor future compliance.

EPA to monitor future compliance (9 Actions).

EPA to monitor future compliance.

EPA to monitor future compliance (4 Actions).

EPA to monitor future compliance (3 Actions).

1.3. Pollution licences

The most important tool in regulating point source air pollution is the pollution licencing system. In all states, environmental and planning legislation specifies that certain industrial activities must be carried out with a pollution licence, issued by the relevant environmental authority. These licences specify certain conditions in relation to limits on the types, and amounts, of pollution that can be discharged, as well as monitoring and reporting obligations with which the holder of the licence must comply. It is generally an offence to breach the conditions of a pollution licence. Whilst pollution licences ostensibly operate to prevent or reduce pollution, in reality they allow an industrial site to lawfully emit pollution that may be higher than the state or territory threshold limit. In this regard, environmental authorities have a fairly wide discretion in determining the conditions of a pollution licence, and reporting obligations with which the holder of the licence must comply. It is generally an offence to breach the conditions of a pollution licence.

Whilst pollution laws are designed to protect the community and the environment, the intermingling of planning and environmental law through the pollution licencing system generally means that greater weight is given to economic considerations than differences between air quality standards in each state and territory jurisdiction, as compared to national AAQNEPM standards.

8 These two facilities are highlighted in this example because they are similar operations (and produce similar pollutant loads) to the two facilities examined in the case studies in section 3 below.

9 See section 128, Protection of the Environment Operations Act 1997 (New South Wales); cf Environmental Protection (Air) Policy 2008 (Queensland).

10 Sulphur dioxide and lead are highlighted in table 3 because these are the two pollutants examined in detail in relation to the community health impacts of point source air pollution in the case studies located in section 3 below.

11 See for example, section 45, Protection of the Environment Operations Act 1997 (NSW); section 47, Environment Protection Act 1993 (South Australia).
Table 3. A comparison of lead and sulphur dioxide air pollution standards by jurisdiction.

|                          | New South Wales (NSW) | Queensland (QLD) | South Australia (SA) | Tasmania (TAS) |
|--------------------------|-----------------------|------------------|----------------------|----------------|
|                          | Reg.\(^a\)            | Lic.\(^d\)       | Reg.\(^c\)           | Lic.\(^i\)     |
| Sulphur dioxide          |                       |                  |                      |                |
| Pre-2011                 | 0.20 ppm/hr           | 365/hr           | 0.20 ppm/hr          | 0.20 ppm/hr    |
| Post-2003                | 0.08 ppm/dy           | 80/yr            | 0.08 ppm/dy          | 0.02 ppm/yr    |
| Post-2006                | 0.02 ppm/yr           | 2,500/hr         | 0.02 ppm/yr          | 0.02 ppm/yr    |
| Lead                     |                       |                  |                      |                |
| Pre-1986                 | 0.5/yr                | 1.5/3 mths       | 0.5/yr\(^m\)         | 0.0015/90 day  |
| 1986–1997                | 20                    |                  | 1.1/yr               | 0.0015/90 day  |
| 1997–2005                | 10                    |                  | 1.6/yr               |                |
| Post-2005                | 1                     |                  | (based on rolling daily |                |
|                          |                       |                  | measurements)        |                |

\(^a\) National Environment Protection (ambient air quality) measure 1998 (Schedule 2).
\(^b\) There are no state-wide air quality standards in force in Western Australia. The values listed in the table refer only to those regions specified in the Environmental Protection (Goldfields Residential Areas) (sulphur dioxide) Policy 2003, namely Kalgoorlie-Boulder, Kambalda, Coolgardie and Kurrawong Aboriginal Reserve.
\(^c\) Protection of the Environment Operations (clean air) Regulation 2010 (Schedule 4).
\(^d\) Perilya Broken Hill Ltd Operations—Environment Protection Licence No. 2688 and 2683, granted by the NSW EPA on 20 April 2000.
\(^e\) Environmental Protection (air) Policy 2008 (Schedule 1).
\(^f\) Environmental Protection (Air) Policy 1994 (Schedule 1).
\(^g\) Mount Isa Mines Ltd Operations—Environmental Authority No. MIN102700011, granted by the Queensland Department of Environment and Heritage Protection and Mount Isa Mines Limited Agreement Act 1985, Schedule H.
\(^h\) Environmental Protection (Goldfields Residential Areas) (sulphur dioxide) Policy 2003.
\(^i\) Kalgoorlie Nickel Smelter—Licence No. L8653/2012/2, granted by the WA Department of Environment and Conservation on 11 June 2012.
\(^j\) The licence imposes different standards at different monitoring sites.
and some exceptions do occur. Lead and sulphur dioxide are criteria pollutants and their limits are environmentally based criteria. Lead and sulphur dioxide are set in accordance with human-health and/or hazardous substances, referred to as criteria air pollutants because their permissible emission levels are set in accordance with human-health and/or environmentally based criteria. Lead and sulphur dioxide are criteria pollutants and their limits are 0.15 μg m⁻³ (rolling 3 month average) and 75 ppb (hourly average) respectively. Each of the US states is required to adopt enforceable plans to ensure that the CAA’s standards are met, as well as to control emissions that drift across state boundaries (US EPA 2013b). Unlike in the US, binding national air pollution standards and the concept of criteria air pollutants are conspicuously absent in Australia. In addition, whilst pollution licences (known as operating permits) are issued to US industrial facilities, unlike in Australia, such operating permits must not allow emissions in excess of air pollution limits mandated in general pollution laws (such as the CAA or NAAQS). Moreover, operating permits are required to be regularly reviewed, including in the event that the CAA or NAAQS is amended (US EPA 2013a).

1.4. Comparison with international standards

In the US, the regulation of air pollution is far more comprehensive. Under the provisions of the United States Clean Air Act (CAA), for example, the United States Environmental Protection Authority (US EPA) is required to publish a list of air pollutants and set air quality standards in relation to those pollutants, averaged over certain time periods according to the specific pollutant (US EPA 2013b). The US EPA, under the CAA, has set National Ambient Air Quality Standards (NAAQS) in relation to a number of hazardous substances, referred to as criteria air pollutants because their permissible emission levels are set in accordance with human-health and/or environmentally based criteria. Lead and sulphur dioxide are criteria pollutants and their limits are 0.15 μg m⁻³ (rolling 3 month average) and 75 ppb (hourly average) respectively. Each of the US states is required to adopt enforceable plans to ensure that the CAA’s standards are met, as well as to control emissions that drift across state boundaries (US EPA 2013b). Unlike in the US, binding national air pollution standards and the concept of criteria air pollutants are conspicuously absent in Australia. In addition, whilst pollution licences (known as operating permits) are issued to US industrial facilities, unlike in Australia, such operating permits must not allow emissions in excess of air pollution limits mandated in general pollution laws (such as the CAA or NAAQS). Moreover, operating permits are required to be regularly reviewed, including in the event that the CAA or NAAQS is amended (US EPA 2013a).

The World Health Organisation (WHO) publishes air quality guidelines designed to enable the establishment of national standards for air quality (WHO 2006). A separate guideline prepared specifically for Europe also contains recommended standards for lead-in-air concentrations (WHO 2000). A comparison of the WHO guidelines, and US standards for lead and sulphur dioxide, is shown in table 4.

### Table 4. International air pollution standards for lead and sulphur dioxide.

| Air pollutant (μg m⁻³ unless stated) | International standard |
|-------------------------------------|------------------------|
|                                     | WHO                    | US EPA NAAQS          |
| Sulphur dioxide                     | 500/10 min 20/d        | 75 ppb h⁻¹            |
| Lead                               | 0.50 yr⁻¹              | 0.15/3 months         |

Public safety (ANEDO 2013). Moreover, in certain cases, completely new laws have been created in relation to specific sites that override the conditions contained within pollution licences, or operate to limit the power of the relevant environmental authority to vary a pollution licence.¹²

1.5. Environmental justice and air pollution in Australia

Outside of Australia, the observed inequity in the geographic distribution of environmental pollution has resulted in both academic, and community-based, environmental justice analyses. These analyses have recognized the fact that the law sometimes provides unequal protection from environmental pollution to different groups in society, including, for example, racial or ethnic minorities, isolated communities and people of lower socio-economic standing (Higginkbathom et al 2010). In Australia, only a limited amount of environmental justice research has been conducted (Strangio 2001, Lloyd-Smith and Bell 2003, Arcioni and Mitchell 2005, ). However, this lack of research is not an indication that environmental injustices do not exist. Indeed, the only national scale quantitative study conducted in Australia to date echoed international findings by showing that communities hosting industrial pollution sources contained significantly higher proportions of Indigenous populations and relatively greater socio-economic disadvantage, when compared to communities without industrial pollution sites (Chakraborty and Green 2014).

2. Methods

2.1. Document analysis

Relevant Australian and international legislation, policies and guidelines, and data from Australian environmental regulators (in particular the NSW EPA) have been reviewed alongside recent literature on environmental justice, air pollution regulation and the health impacts of air pollution from industrial facilities, to identify general shortcomings in the current design and enforcement of air pollution regulation in Australia (as set out above and discussed in section 4 below).

2.2. Case-study assessment

In addition, two case studies, Mount Isa in Queensland, and Port Pirie, in South Australia, are discussed in section 3 below to provide specific illustration of the gaps that currently exist in the regulation of air pollution in Australia. Both towns host large scale mining and/or smelting operations, although neither have a large enough population to trigger compulsory monitoring under the AAQNEPM. Concerns have been raised in both places about the impact of emissions from industrial sites on public health (Mackay et al 2013).

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¹² See for example, Port Pirie Smelting Facility (Lead-in-Air Concentrations) Act 2013 (SA); Mount Isa Mines Limited Agreement Act 1985 (QLD).

¹³ This requirement applies to new or modified industrial facilities, and some exceptions do occur—see USA EPA (2013a).
The results of the document analysis and case-study assessment are discussed in sections 4 and 5 below to support a call for the implementation of a new and improved regulatory system in Australia to provide all Australians with equal and adequate protection from air pollution, particularly those living in close proximity to polluting industrial facilities.

3. Results

3.1. Mount Isa
Mount Isa is remotely located in North-West Queensland and is one of the largest mining communities in Australia, with a population of around 21 000 (ABS 2013a). There has been significant mining and smelting activity in the area since the early 1930s, and currently a number of mines and smelters are operating, owned by Glencore Xstrata Mount Isa Mines (Mackay et al 2013, Taylor et al 2014). As an isolated rural community it is characterized, amongst other things, by socio-economic disadvantage (Higginbotham et al 2010). It is also home to proportionally significantly higher numbers of Indigenous Australians (ABS 2013a).

These mines constitute the largest copper–lead–zinc mining operation in Australia, employing 5000 people and contributing approximately AUS$1 billion to the economy annually. The site is a major emitter of air pollutants including lead, sulphur dioxide, arsenic and cadmium, with historical and current emissions leading to significant environmental lead pollution in the region (Mackay et al 2013).

The facility operates under an environmental authority issued by the Queensland Government, in conjunction with a Transitional Environmental Program (TEP), provided for under the provisions of the Environmental Protection Act 1994 (Qld). Air pollution containing sulphur dioxide, is permitted to be released from the facility at higher levels than those specified in the Environmental Protection (Air) Policy 2008 (Qld), which is generally in line with the AAQNEPM (see table 3). The purpose of the TEP is to guide the facility’s transition from current emission levels to the standards set out in the 2008 Policy by 2017. However, whilst lead emissions are currently capped at national and Queensland standards under the TEP, sulphur dioxide one hour values are permitted to remain significantly higher than these standards until 2016 (Taylor et al 2014). This is significant because the facility operators have indicated that they will decommission the copper smelter (but not the lead smelter) by 2016 to comply with this directive (Taylor et al 2014).

The TEP is not the first instance where special arrangements have been made between the facility’s operators and the Queensland government to allow mining and smelting operations to pollute local communities at levels above standards applying to the wider population. Previously, the Mount Isa Mines Limited Agreement Act 1985 (Qld) operated to ratify an agreement between the Queensland government and the facility owners. In 1997, one year before the implementation of the AAQNEPM, the Queensland government amended the Act to include permissible air pollution limits for the Mount Isa mining facility, in relation to lead and sulphur dioxide, significantly in excess of those set out in the AAQNEPM (Taylor et al 2014). The amendments also stated that the air quality standards included in the Act were the only standards applying to the Mount Isa facility, despite any environmental legislation or other law to the contrary. These standards were repealed with the introduction of the TEP in 2012 (Taylor et al 2014).

The National Pollutant Inventory (NPI), Australia’s pollution release transfer register, identified the Mount Isa Mines facility as the nation’s largest emitter of arsenic, cadmium, copper, lead, sulphur dioxide and zinc compounds to air, land and water systems from the period between July 1999 and June 2008 (Mackay et al 2013, NPI 2013). Pollution sources include direct emissions from the copper and lead smelter stacks, and fugitive emissions from mining, ore transport, ore preparation, waste disposal, and sintering and smelting operations (Queensland EPA 2008). Despite upgrades to emission capture technology and ore management techniques, the combined effects of historic and contemporary emissions contribute to significant environmental lead contamination in and around the Mount Isa urban area (Taylor et al 2010, 2011).

3.2. Port Pirie
Port Pirie is situated at the top of the Spencer Gulf in South Australia. The town and surrounding districts have a population of approximately 175 000 people (ABS 2013b). Port Pirie has one of the highest incidences of socio-economic disadvantage in South Australia (ABS 2011) and a proportionally higher population of Indigenous people than the Australian average (ABS 2013b). Port Pirie is also home to a major lead smelter, which is currently operated by Nyrstar under a pollution licence granted by the South Australian Environmental Protection Authority (SA EPA). The town has a long history of lead smelting, with the first smelter opening in 1889, processing ore brought in by train from Broken Hill. From that time onwards, Port Pirie has been a single industry town, meaning that a substantial proportion of the local population is employed at the smelter, even though today, ore processed there is brought in by ship from overseas. The smelter currently provides around 2500 jobs, and employs approximately 15% of Port Pirie’s workforce (Taylor et al 2014). These employment figures belie the relatively large scale of the current smelter operations, which in 2013, produced 179 000 tonnes of lead (Nyrstar 2014).
Knowledge of the issues concerning lead contamination from the smelter has been longstanding. In 1925, the South Australian government held a Royal Commission into the issue, which concluded that lead dust from the smelter was the principle cause of the elevated levels of lead poisoning in the region (Taylor et al 2014). In the 1980s, there was renewed concern from researchers in regard to the potential health effects of environmental lead exposure, in particular on the mental development of young children (Heyworth et al 2009). More recent studies have shown that high concentrations of atmospheric lead dust from the smelter were the dominant source of elevated blood lead levels in local children (Esterman and Maynard 1998), and provided confirmation that atmospheric lead concentrations were related to surface deposition within the township (Taylor et al 2013).

Despite the long association of the smelter with lead contamination in the surrounding township, the community has historically been divided over the risks posed by the elevated levels of lead in their town (Heyworth et al 2009). Indeed, many residents have discounted the potential health issues associated with lead poisoning. Their reasons are varied, but include concerns regarding the potential stigma associated with Port Pirie being labeled as a ‘polluted’ town, and the fact that many in the community have had a long association with the lead smelter as a source of employment, and therefore any moves to limit its operation would threaten their financial security (Heyworth et al 2009)—even though this also means that many of the same people who work at the lead smelter are also subject to the impacts of its pollution in their homes. This historical lack of local concern regarding the smelter operations echoes patterns elsewhere (Sullivan 2014), and may provide an explanation for the reticence of the SA EPA and the state government to take steps to address the lead pollution afflicting the town. Indeed, despite mounting evidence to the contrary, until recently the government maintained that the source of lead in Port Pirie’s soils, and therefore the cause of elevated blood lead levels in children, was historical smelter emissions—not emissions from modern day operations (Taylor et al 2014).

Action to address the high levels of lead pollution from the smelter was not taken until 2012, when the SA EPA varied the terms of the smelter’s pollution licence. Following this, Nyrstar and the state government committed to a process of transformation and replacement of the smelter, and allocated funds to undertake lead abatement measures (Taylor et al 2014). However, whilst implementing a more stringent daily air quality monitoring condition, the revision of the smelter’s pollution licence merely brought the limits set for the maximum annual lead-in-air emissions from the smelter in line with the limit specified in the AAQNEPM of 0.5 μg m$^{-3}$ (Taylor et al 2014). In addition, the pollution licence specifically permits annual lead emissions to occur at higher levels at two of the four monitoring sites. Indeed, at one of the sites, lead emissions are permitted to be as high as 1.6 μg m$^{-3}$—more than three times the national standard.

The lack of regulatory action to address lead pollution in Port Pirie is particularly significant given that Nyrstar has recently committed to a AUS350 million redevelopment of its operations (AAP 2014). The redevelopment project has been substantially supported by the state government, which has committed to underwrite the funding of the project and has also indicated that it will provide an indemnity of up to AU $115 million for any potential environmental, health or property liabilities arising from the smelter upgrade (Taylor et al 2014). The redevelopment includes the introduction of new technology, which both Nyrstar and the government claim will increase plant efficiency and reduce emissions (AAP 2014). However, echoing the parliamentary intervention described in the Mount Isa case study, the South Australian government has introduced new legislation which limits the powers of the SA EPA to reduce maximum limits for permissible lead-in-air emissions under the smelter’s pollution licence for a period of 10 years following the commencement of the legislation. In addition, this legislation purports to supersede any other South Australian law or policy that would have the effect of reducing these maximum limits.

Around 23% of children in Port Pirie under the age of four have blood lead levels higher than 10 μg dL$^{-1}$ (SA Health 2014), the current NHMRC guideline for lead in blood levels (which is in line with WHO recommendations (WHO 1995), and the target level around which programs for Port Pirie have been developed). However, the new draft NHMRC guidelines have dramatically revised its position, concluding that blood levels above 5 μg dL$^{-1}$ should be investigated and reduced, especially for young children and pregnant women (NHMRC 2014).

4. Discussion

4.1. Protection of human health

The current regulatory and pollution licensing system is allowing lead and sulphur dioxide emissions at levels likely to be dangerous to human health in Mount Isa and Port Pirie. Studies have shown that the atmospheric deposition of mine and smelter pollutants form a significant pathway of lead exposure in the Mount Isa community (Mackay et al 2013). Other studies have shown that 11.3% of 400 local children aged between 1 and 5 years of age, sampled between 2006 and 2007, had lead levels above 10 μg dL$^{-1}$ (Queensland Health 2008). Further, asthma mortality rates are 322% higher in Mount Isa than the rest of the

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14 Port Pirie Smelting Facility (Lead-in-Air Concentrations) Act 2013 (SA).
Port Pirie region had elevated, i.e. above 10 μg L⁻¹, blood lead levels above 10 μg L⁻¹ (excluding surrogate maternal blood lead values) (Simon et al 2013, Taylor et al 2014). In addition, more than 3000 children in the Port Pirie region had elevated, i.e. above 10 μg L⁻¹, blood lead levels in the last decade (SA Health 2014).

In light of the above, and in the absence of any evidence indicating that the industrial facilities at Mount Isa and Port Pirie are operating in contravention of the pollution limits set in their operating licences, it appears that the current legal standards at which these facilities operate are not adequate to prevent pollution at levels harmful to human health.

4.2. Adequacy of regulation and monitoring
A significant problem with the various air pollution standards relates to the fact that they set regional thresholds for ambient air pollution. This approach tends to ignore the direct, and localized, impacts of pollution on communities in close proximity to polluting sites. As discussed above, the AAQNEPM seeks only to obtain a representative measure of air quality within any given region, and monitoring under the AAQNEPM is not required at all in smaller communities—despite the fact that many industrial sites are located within these smaller, regional towns. Further, the standards set often refer only to average pollutant concentrations over defined time periods. For example, in Mount Isa the relevant standard for lead emissions is 0.5 μg m⁻³ averaged over a year. Whereas in Port Pirie, the average yearly limit of 0.5 μg m⁻³ is based on daily measurements (Taylor et al 2014). The problem with temporal averaging is that it will tend to mask short term, high intensity exposure episodes, and these can be very damaging to human health (EJA 2014).

This approach to pollution monitoring also fails to take into account the impacts of cumulative deposition of pollution from industrial sites over longer periods of time, so called ‘legacy’ pollution. It is well established that pollutants from industrial facilities are pervasive and persistent, and remain in the environment for long periods of time. In these circumstances, air pollution standards that are based on averaging total emissions over specific time frames are not appropriate. If a community suffers a pollution spike, the deposited pollution continues to be a source of significant potential exposure, even though monitoring records may show that average levels of pollution are within acceptable standards. As such, the National Clean Air Agreement (NCAA) should ensure that air pollution standards are implemented which specifically acknowledge the deleterious health impacts of short term pollutant exposure. In addition, the cumulative effects of air pollution deposition (including an acknowledgment of existing sources of pollution within the environment) should be taken into account when determining appropriate air pollution limits to apply to industrial sites.

4.3. Why does regulation fail?
The regulation of air pollution fails, not only because of the patchwork of legislation governing the issue, but also because there appears to be a lack of focus on air pollution offences by government regulators. Unfortunately, there is limited publicly available data in respect to the relationship between the industrial facilities, as seen in the two case studies above, and the relevant state regulators. The SA EPA provides a public register of major prosecutions, but there is no information regarding the Port Pirie smelter’s compliance with its licence conditions. By contrast, the Queensland Government does not make any such data publically available about the Mount Isa Mines facility.

In relation to the Port Pirie smelter, a review of the SA EPA’s public register indicates that it has been subject to only one major prosecution (SA EPA 2014). In 2001, Pasminco was fined $400,000 in relation to the accidental release of a zinc-electrolyte solution into a nearby watercourse, resulting in the death of 50 fish. Despite the NPI documenting ongoing and consistent high levels of air pollution, the only significant prosecution undertaken relates to this incident of water pollution. Indeed, of all the prosecutions listed on the SA EPA’s register (which covers the period from 1998 to 2012), only one has involved air pollution. In that instance, occurring in 1999, Mobil was fined $240,000 for causing material environmental harm through the discharge of gaseous ethyl mercaptan. Overall, 25 of the 64 prosecutions listed on the SA EPA’s register relate to the pollution of waters (SA EPA 2014), even though air pollution is often far more damaging to human health and consequently, it would be reasonable to expect that a greater regulatory focus should be placed on it.

In contrast to the environmental compliance records made publicly available in South Australia and Queensland, the NSW EPA maintains a detailed public register of environmental prosecutions, as well as compliance records with environmental protection licences (NSW EPA 2014). Accordingly, the NSW EPA’s register provides a good opportunity to review the frequency of prosecutions in relation to air pollution offences, the magnitude of penalties issued, and the response of regulators to non-compliance with licence conditions. As the environmental regulators in

15 Similar problems would occur with other pollution reduction mechanisms that seek to reduce the total level of pollutants in a system, but ignore more localized impacts of pollution, such as emissions trading schemes.
other jurisdictions operate in a similar fashion to the NSW EPA, the results of this review can be applied, by extension, to the likely regulatory scenarios in other states and territories, including those in Queensland and South Australia, which respectively govern the Mount Isa and Port Pirie facilities discussed in the case studies in section 3.

In this regard, the NSW EPA’s register indicates that there have been very few prosecutions in relation to air pollution offences, and when prosecutions have been undertaken, the penalties issued by the Courts have been moderate. Since the commencement of the POEO Act, there have been only six significant prosecutions in relation to air pollution offences (see table 1). The situation is similar in the neighboring state of Victoria, where the Victorian EPA prosecuted air pollution offences only five times in the last five years (EJA 2014).

In the absence of regulatory will to prosecute general air pollution offences, an effective pollution licensing system is essential to ensure that air pollution from industrial sites is limited to approved levels. However, in order to work effectively, this system requires proper monitoring of point source air pollution, and vigilant enforcement of breaches of licence conditions. Unfortunately, this is often lacking and can be illustrated by examining the prosecution rates of breaches of pollution licences (offences under section 64(1) of the POEO Act) in relation to two industrial sites in NSW that are similar to the operations in Mount Isa and Port Pirie. Tables 2(a) and (b) show the number of licence breaches in relation to mining and smelting operations undertaken at Broken Hill (under EPL 2683 and EPL 2688) and smelting/waste disposal operations at Cockle Creek Smelter.

Table 2(a) shows that between 2000 and 2013, there were 280 recorded breaches of the conditions attaching to the pollution licences for the mining and smelting operations in Broken Hill, which are currently undertaken by Perilya Broken Hill (and previously by Pasminco Broken Hill Mine). According to the NSW EPA’s public register, the NSW EPA took action in relation to these breaches on only ten occasions. Furthermore, on only three occasions, did this action result in prosecutions (a rate of only 1.1%)16. Similarly, table 2(b) shows that at the Cockle Creek Smelter, there were 288 breaches of licence conditions between 2001 and 2013, with only 20 interventions by the NSW EPA in response, and again only two prosecutions (a rate of 0.7%)17.

It should be noted that the Broken Hill and Cockle Creek pollution licences did not impose any specific limits in regard to air pollution, although ambient air quality monitoring was required. Therefore, the facility operators were bound to operate in accordance with the relevant NSW standards for air pollution set in the general environmental legislation. It would appear then that where specific limits are not set in pollution licences, the regulatory authorities maintain their reluctance to take action against industrial polluters. For example, the pollution licence for the Cockle Creek Smelter required ambient air quality to be monitored and reported in an annual return. The 2013–14 annual return reported that at one particular monitoring point, the annual mean lead in air concentration was 41.6 μg m⁻³. This reading is 83 times higher than the standards set by the AAQNEPM. In addition, the highest individual lead in air reading was 254 μg m⁻³—508 times higher than the existing AAQ-NEPM. This indicates that along with the high background levels of lead emissions, the facility also released significant lead emissions spikes. Despite receiving this data indicating that emissions of air pollutants from the Cockle Creek Smelter were far in excess of any applicable standards, the NSW EPA does not appear to have taken any action under the relevant legislation to limit this pollution.

4.4. Private legal action for damage caused by industrial air pollution

In order to side-step this lack of regulatory will, members of the public may seek to remedy breaches of environmental law through the use of specific civil enforcement provisions which are included in environmental legislation in some jurisdictions18. However, procedural hurdles and potential exposure to costs orders often discourage public interest litigants. In other circumstances, where a person has been directly affected by air pollution from an industrial site, he or she may be able to bring a private legal action in order to recover compensation for the damage suffered. A legal suit in negligence is usually the most appropriate form of action in these cases19. Where a large class of people has been affected by pollution, this may give rise to the possibility of a class action suit, and major damages payouts, potentially in much higher quantities than any fine that would be issued by the courts for a breach of the environmental legislation. Accordingly, the risk of large class action negligence suits is a potential concern for industrial polluters,

16 Environment Protection Authority v Pasminco Broken Hill Mine Pty Ltd (2002) NSWLEC 70 (two separate charges heard together); Environment Protection Authority v Perilya Broken Hill Ltd (Unreported, Broken Hill Local Court 26 June 2005).
17 Environment Protection Authority v Pasminco Cockle Creek Smelter Pty Limited (2001) NSWLEC 270; Environment Protection Authority v Pasminco Cockle Creek Smelter Pty Limited (2003) NSWLEC 439.
18 See for example, Protection of the Environment Operations Act 1997 (NSW), sections 252 and 253.
19 Negligence means a failure to exercise care and skill. In an action for negligence, the plaintiff must first prove that the defendant owed him or her a duty to take reasonable care. In general, a duty of care is owed only if the defendant ought reasonably to have foreseen that his or her conduct may be likely to cause loss or damage to the plaintiff. The plaintiff must then prove that the defendant breached that duty by failing to take reasonable care and that the breach of duty caused the injury or damage suffered by the plaintiff. Finally, the plaintiff must demonstrate that the injury or damage suffered was not too remote a consequence of the breach of duty.
which may encourage them to self-regulate their emissions of toxic air pollutants to safe levels.

However, in any such negligence suit, the element of causation may prove difficult to establish in the context of damage allegedly caused by air pollution from an industrial site. In order for a plaintiff to establish causation in these cases, it is necessary to prove that it is more likely than not (on the balance of probabilities) that the negligence of the defendant caused or materially contributed to the injury or damage suffered. In general, causation would be established if it appears that the plaintiff would not have sustained injuries had the defendant not been negligent. This may be difficult to demonstrate where there may be more than one possible cause of the plaintiff's injuries, for example, where the pollutants emitted to the air by the defendant's industrial site are also present in the environment generally. In such circumstances, the defendant may have trouble establishing a clear causal pathway between the polluting actions of the defendant, and the damage or injury suffered by the plaintiff as a result of coming into contact with the relevant pollutant. Such hurdles to successfully mounting class action negligence suits in respect of damage caused by pollution are present both in Australia and other jurisdictions that may have stronger air pollution regulations, such as the US (Johnson 2010).

This was the case in the only reported negligence claim against Mount Isa Mines for alleged lead poisoning. In that case, it was alleged that airborne lead emissions from the facility had caused brain damage and dysfunction to a young resident. However, due to technical defects in the plaintiffs' arguments relating to the issue of causation, the case was dismissed at a very early stage.

There is also only one reported negligence claim in relation to the operation of the Port Pirie Smelter. In this case, the plaintiffs sought to simultaneously bring class action suits against Pasminco in respect of alleged contamination of property and personal injury caused by exposure to harmful emissions (containing lead, sulphur dioxide and other pollutants) from both the Port Pirie and Cockle Creek Smelters. However, this challenge also failed at the outset on technical grounds as the claimants had inappropriately attempted to join unconnected claims and failed to separate issues and parties in their class action suit.

A further challenge that plaintiffs face in these kinds of proceedings is that the industrial facilities usually operate under the terms of a pollution licence. In these circumstances, whilst not the general rule (Bates 2013), a defence is likely to be available where the activities authorized under the licence are done without negligence, and there was no reasonable way to conduct those activities without causing the alleged damage. Accordingly, a plaintiff complaining of damage caused by pollution from an industrial plant licensed to carry out a polluting activity would generally need to show that the plant had acted negligently in conducting the activities authorized under the licence, and that this negligence was the source of the damage suffered by the plaintiff.

The difficulties that members of the public may experience in protecting their rights through private legal action in relation to damage caused by air pollution highlights Australia's pressing need for the introduction of rigorous air pollution standards that apply uniformly across all regions of the country, and which prevent the emission of air pollution at levels that may be harmful to human health. Such standards should be addressed in the proposed NCAA.

4.5. Proposed NCAA
Currently, plans to work towards the development of the NCAA have been delayed at least until July 2016. Accordingly, it is now a good time to put forward proposals in relation to the format and content of the NCAA, considering the limitations of the current regulatory framework. The key component of any NCAA developed is the provision of mandatory and uniform air quality standards applicable to all regions in Australia, regardless of size or locality. This is the only way to ensure that meaningful protection from air pollution is provided to all Australians.

It is the current intention of the Commonwealth and state governments to develop an agreement culminating in the NCAA, in which roles and responsibilities are appropriately delineated between the different levels of government (O'Sullivan 2014). This process would be carried out in a manner similar to the way the NEPC and the NEPMs were developed. As an alternative, there have been recent calls for the Federal government to exercise its powers to implement a national scheme for air pollution, which would be legally binding upon the states and territories, but would not require their agreement to its implementation (EJA 2014). Such a scheme would be similar to the CAA in the US, in that a single piece of Federal legislation would establish national air pollution standards that would apply to every community across Australia, regardless of their size or location. Whilst the national standards would be binding on the states and territories, as with the CAA, they would have flexibility in regard to how they choose to implement them in their own laws.

It has been proposed that the scheme should appoint a Commonwealth regulator (EJA 2014). This regulator would act in a similar way to the US EPA in the administration of the CAA. That is, it would be responsible for ensuring that the states and territories take action to implement the national standards, and undertake necessary enforcement actions in cases of non-compliance. On the other hand, state and territory environmental agencies would be responsible for

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20 Body v Mount Isa Mines Limited & Ors (2013) QSC 188.
21 Cook v Pasminco Ltd (2000) VSC 534 (15 December 2000).
implementing the national standards in their own regulatory frameworks for air pollution, and monitoring and enforcing local breaches of the national standards (EJA 2014). In addition, the states would retain responsibility for managing their own pollution licensing schemes, however, they could not set maximum air pollutant limits higher than those prescribed by the Federal scheme.

Although plans to harmonize pollution regulation were mooted in 2011, they are still not finalized. In 2014, Federal and state Environment Ministers signaled their intention to work towards finalizing a NCAA by 2016, and their plans to vary the AAQNEPM in relation to ultrafine particulate pollution (Hunt 2014). Accordingly, it is a good time to expose the inconsistencies and failings of the current regulation of air pollution, especially in regard to health impacts, to ensure that this new agreement is in line with international standards.

5. Conclusion

5.1. Current regulatory landscape

Whilst NAAQS are set by the AAQNEPM, which are roughly in line with international standards, these are not binding on the states and territories. Instead, the states and territories implement their own standards through a mix of legislation and policy documents—and these standards are not always enforceable by regulatory authorities. Moreover, the standards are often set by reference to average pollutant output over certain periods of time. This has the effect of masking emissions spikes, and ignoring the potential human health impacts of short-term acute exposure. This hodgepodge of ill-defined and overlapping air pollution standards results in a regulatory framework which provides incomplete levels of protection to Australians.

Complicating matters further is the use of pollution licences to authorize the operation of industrial facilities, such as smelters and mines, which are often the largest emitters of point-source air pollution. These licences may be used to circumvent air pollution standards mandated by legislation. The relevant authority granting the licence is given discretion to set emissions thresholds that may be higher than Federal or state/territory standards, based on various considerations including the economic costs associated with requiring industrial facilities to lower their pollutant output. It appears that these economic concerns are often given precedence over the potential health impacts of the pollution on people living in neighboring communities, often in remote places already characterized by social and economic disadvantage. In effect, this provides the industrial facilities with an economic subsidy, as they are not required to invest in equipment or processes that lower their emissions levels, or account for the damage their pollution may cause to surrounding communities (Taylor et al 2014). The impacts that these kinds of economic policy decisions are having on the health of communities is evident in industrial towns like Mount Isa and Port Pirie, where residents are routinely exposed to high levels of air toxics that are absorbed by their bodies at levels far in excess of that recommended by Australian, and international, health authorities.

Notwithstanding that air pollution standards seem to be often set with the interests of polluting industries firmly in mind, there remain further problems with the willingness or capacity of regulatory authorities to enforce breaches of standards set in the legislation or individual pollution licences. In the apparently rare event that disciplinary action is taken against an offending industrial facility, the penalties issued for the relevant breaches of the air pollution laws or standards are usually insufficient to deter recidivism. Compounding this problem, individuals who have suffered damage from exposure to air toxics are often deterred from mounting private legal challenges seeking compensation by significant evidentiary and cost burdens.

5.2. Required improvements

The failings of the Australian regulatory system for air pollution appear to have a disproportionate impact on people living in communities in close proximity to industrial sites such as smelters. Such communities are likely to have higher proportions of Indigenous populations and relatively greater socio-economic disadvantage, when compared to communities without industrial pollution sites (Chakraborty and Green 2014). Given that these people often already suffer from social and economic disadvantage, the inconsistencies in the regulation of air pollution in this country amount to a significant issue of environmental justice. It is important that this issue is specifically recognized in the development of the NCAA, so that new mandatory air quality standards are introduced that genuinely protect everyone from the impacts of air toxics.

Where science has identified health issues linked to a particular pollutant, the regulatory system must operate in a strong and responsive manner, requiring facility upgrades where standards are not being met, and vigilantly enforcing breaches of standards. In no circumstances should regulators be given discretion to lower air quality standards applying to particular industrial facilities for the sole purpose of economic and political expedience (Taylor et al 2014). The NCAA must operate to protect all Australians equally from damaging air pollution. This would require the prescription of legally binding air quality standards that cover a wide range of substances, are based on scientific evidence, and at the very least conform to international standards set by the WHO. These standards should specifically take into account
point-source air pollution, the impacts of short term,
high-intensity pollution events on local populations, and
the cumulative effects of pollutants deposited via
air borne emissions, and should be subject to a review
process to ensure continual improvement in air qual-
ity in Australia.

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