

2008

# Environmental regulations pertaining to rail: developing best practice

Michael Charles  
*Southern Cross University*

Tania von der Heidt  
*Southern Cross University*

Rachel Ryan  
*Southern Cross University*

Rocco Zito  
*University of South Australia*

Christopher Collier  
*RailCorp*

*See next page for additional authors*

---

## Publication details

Charles, M, von der Heidt, T, Ryan, R, Zito, R, Collier, B & Hughes, B 2008, 'Environmental regulations pertaining to rail: developing best practice', paper presented at the 2nd annual Environmental Management in Rail Conference, Melbourne, Vic., 14-15 October.

ePublications@SCU is an electronic repository administered by Southern Cross University Library. Its goal is to capture and preserve the intellectual output of Southern Cross University authors and researchers, and to increase visibility and impact through open access to researchers around the world. For further information please contact [epubs@scu.edu.au](mailto:epubs@scu.edu.au).

---

**Authors**

Michael Charles, Tania von der Heide, Rachel Ryan, Rocco Zito, Christopher Collier, and Brett Hughes

# Environmental Regulations Pertaining to Rail: Developing Best Practice

**2nd Annual Environmental Management in Rail Conference, Rendezvous Hotel, Melbourne,  
14-15 October 2008**

## **Authors:**

*Michael B. Charles (Southern Cross University), Tania von der Heidt (Southern Cross University), Rachel Ryan (Southern Cross University), Rocco Zito (University of South Australia), Christopher Collier (RailCorp), Brett Hughes (ARA)*

## **Abstract:**

The Australian rail industry consists of a complex network of rail operators and owners. Against this background are separate regulatory regimes for safety, access, economic and environmental functions, which are overseen by a mix of State governments, including the relevant Environmental Protection Agencies (EPAs), and the Commonwealth. Within the rail industry, these regimes, owing to incompatibility and lack of cohesion, are regarded as leading to inefficiencies within the sector, while the need to comply with different and sometimes contradictory laws and accompanying regulation is believed to create unnecessary red tape. This paper stems from a research project currently being undertaken by the CRC for Rail Innovation.<sup>1</sup>

## **1. Introduction**

The CRC for Rail Innovation's *Environmental Regulations Pertaining to Rail* project is looking to determine the impact of a lack of harmonization with respect to legislation and regulation pertaining to the environmental performance of the Australian rail sector. Attention is especially being paid to greenhouse gas (GHG) emissions, air pollution (including particulate emissions), and noise. The research team is not looking directly at the provision of rail infrastructure, though the researchers are investigating the impact of urban development adjacent to existing rail lines.<sup>2</sup> The project's fundamental aim is to provide greater definition to the legislative and regulatory setting in which rail operates, in addition to trends that could impact on rail's operational environment. It also seeks to determine, by means of stakeholder interviews and some analysis of comparable industries and jurisdictional environments, the way to redress the current legislative and regulatory problems. An additional objective is to ascertain how the industry can shape its own future. At present, the project team has compiled an *Issues Paper*, in addition to an *Inventory* of environmental legislation and regulation pertaining to the rail sector in various jurisdictions. Towards the end of the year, a *Stakeholder Views Report* will also be available. This paper largely reports the broader findings of the *Issues Paper* (Von der Heidt et al., 2008).

---

<sup>1</sup> The CRC for Rail Innovation is funded by a combination of cash and in-kind resources provided by the Commonwealth, industry participants, and research providers.

<sup>2</sup> A paper based on additional research conducted for the *Environmental Regulations* project is to be presented on this topic at the *Competition and Regulation in Network Industries (CRNI) Conference* to be held 28 November, 2008 in Brussels.

From the preliminary work undertaken for the project, it has emerged that the Australian railway industry perceives that the existing environmental regulations that it faces are in need of improvement. It is a commonly held view that there is a need for harmonization in three areas:

- the structure of environmental legislation (the framework);
- the administration or regulatory processes; and
- prescriptive regulations.<sup>3</sup>

Furthermore, an in-depth review of the relevant literature and policy information shows that there is little information about the nature and extent of inconsistencies in environmental legislation and regulation impacting on Australian railway operations. The Commonwealth, State and Territory governments each have the power to regulate in three major areas of the railway business, viz., structural form, access, and safety (accreditation) regulations. Various levels of regulatory reform have been undertaken in each of these areas. Environmental regulation is a fourth area impacting on railway operations, although no thorough investigation of regulatory harmonization has been undertaken to date, and was recently overlooked in the National Transport Commission's Rail Productivity Issues Paper made public in August 2008. For example, Table 4 (p. 16) on rail regulation across Australia covers economic regulators, safety regulators and safety investigators, but not environmental regulators.

The research conducted for this project enables a better insight into the various ways that the environment is protected in various jurisdictions. In addition to lessons derived from the literature, findings from preliminary interviews undertaken with key industry representatives to determine the problems faced by the industry have highlighted how conflicting regulatory instruments directly impact on rail operations (see Section 3 below for some specific examples).<sup>4</sup> From these interviews, it is clear that inconsistencies between State-by-State environmental regulations, in particular, have had an inequitable impact, especially with regard to the State regulation of noise.

## 2. Types of regulation

As a reference point for the material provided further below in this paper, it is important to be aware of the types of regulation that affect the rail (or indeed any cognate) industry. In general terms, regulation is a general policy tool for correcting market failures and to achieve social efficiency (Sloman & Norris, 2008). Without an immediate profit incentive, private forms have traditionally tended to administer too little self-regulation, while governments have tended to provide too much, thus leading to inadequate investment and a reduction in genuine competition (Majone, 1994). Yet a form of regulation can be achieved internally, either at a firm level, or throughout the industry, though this approach naturally engenders its own problems. Under self-regulation, an industry

---

<sup>3</sup> It is important to note that the work carried out for this project does not pertain to quality; rather it pertains to cohesion and compatibility across different jurisdictions.

<sup>4</sup> Industry participants from the following organizations were interviewed: Pacific National, Australian Rail Track Corporation (ARTC), QR, RailCorp, and Rio Tinto Iron Ore.

adopts its own operational and technical standards, working practices or processes (Productivity Commission, 2006, p. 320).

Broadly speaking, regulation may be divided into three types:

- Self-regulation: a firm will regulate its own activities, or will adhere to practices resulting from industry-led reform.
- Co-regulation: a system in which responsibilities for regulatory development, implementation and/or enforcement are shared between industry and government.
- Government-led regulatory reform: government drives the reform process, though it will consult with industry (to varying degrees).

Of course, determining the appropriate mix of the approaches listed above, especially with respect to environmental matters, is extremely challenging. At present, there has been insufficient research on this theme (von der Heide et al., forthcoming). Costs and benefits associated with the three broad types of regulations are outlined in Table 1 below.<sup>5</sup>

**Table 1: Costs and benefits of government regulation, co-regulation and self-regulation**

	Government regulation*	Co-regulation*	Industry self-regulation*
Time/cost to develop, implement and enforce	- time-consuming and costly to set up	+ delegating responsibility to industry quick and cheap to set up - coordination between government and industry is time-consuming and costly	+ quickest and cheapest to set up
Effectiveness (in terms of achieving goals)	+ more effective since it is compulsory and, ideally, consistent with other industries and broad policies	+ potentially most effective with benefits of government regulation and greater industry commitment to own areas of responsibility	- less effective, since it is voluntary - more susceptible to undue influences from large firms

\* Note: '+' represent areas of potential advantage; '-' represent areas of potential disadvantage (Source: adapted from Productivity Commission, 2006, pp. 317 and 320)

### 3. Regulatory inconsistency in action

Evidence exists of unnecessary cost to the rail industry with repetitive administrative processes in multiple jurisdictions (application, approval, reporting, etc). There are also inconsistent frameworks, policies, practices and procedures in multiple jurisdictions that result in repetitive and inefficient environmental regulation, in addition to incompatibility between jurisdictions. Together, these factors result in repetitive and inefficient environmental regulation, with considerable incompatibility

<sup>5</sup> Stakeholder reactions to the models offered will be made available in the *Stakeholder Report* due to be released later in the year. A summary version will be made available to all participants in the research.

between adjacent jurisdictions. These factors lead to sub-optimal rail operations (as will be indicated in the vignettes below). Furthermore, regulation is developed in isolation, thereby resulting in situations where improvement in one type of pollution results in substantial increases in other forms, e.g., improved noise outcomes at the expense of GHG emissions, or vice versa.

As a snapshot of the sort of inconsistencies being faced by the Australian rail industry, it is useful to look at a few vignettes that encapsulate some of the core problems. Two vignettes (viz., #1 and 2) pertain to rail noise, while another two (viz., #3 and 4) pertain to dust emanating from rail operations.

### **Vignette #1: NSW locomotive noise specifications shut out some operators**

The noise specifications for locomotives, set out in the NSW Department of the Environment & Climate Change (DECC)<sup>6</sup> Environmental Protection Licences under the *PEO Act* (NSW Government 1997), have led to wider environmental issues. Unmodified locomotives pre-dating the Act do not require DECC approval, whereas newer locomotives do, yet may fail to meet the stringent noise limit goals. In other words, older and less environmentally efficient locomotives are still permitted to operate on NSW tracks, while newer and more efficient locomotives have been banned.

A number of “44” class<sup>7</sup> freight trains are still operational on NSW tracks. Built in 1957, these locomotives pre-date and have had no modifications, so they do not require DECC approval. However, another rail operator’s freight locomotives, which were built in 1995, are 50 percent more powerful than the “44” class and are more environmentally sound (particularly with respect to GHG emissions and particulates). Yet these are not permitted on the NSW network since they do not meet the noise limits.

The operator has given up on attempts to meet the noise specifications and now transports its cargo into NSW by road. To meet the noise limits for new operators entering the lines along with trains that have been upgraded or modified, an operator needs to engage a noise consultant to test tonality and noise levels on each throttle setting (such as gears). These consultant reports can be costly.

Even though inter-capital markets no longer recognize state borders, regulations still stop at these traditional borders. It is desirable that the regulators take a borderless perspective with national standards. National specifications for emissions and noise could be provided to locomotive constructors and rail operators to ensure consistency in compliance and assist with environmental improvements overall.

(Source: RailCorp)

### **Vignette #2: Councils approve urban developments adjacent to existing rail corridor**

The lack of planning regulations for developments adjacent to the rail corridor in the Adelaide Hills has led to a proliferation of development alongside the rail lines, with new dwellings constructed only metres away from the corridor boundary. Local Council development plans are not sensitive to the existing rail lines, especially with regard to approvals for developments that closely border rail infrastructure.

An increase in noise complaints overall is attributed to the increasing development along the rail corridor and the number of residents moving into the area. An ongoing cause of complaint is wheel squeal caused when steel wheels from freight trains ‘slip’ on the rail as they travel around curves. The intensification of resident

<sup>6</sup> The equivalent of the EPA found in other States.

<sup>7</sup> Most of the class were withdrawn in 1994, but many have been retained for further use by other freight companies.

complaints has led to issue's politicization, ultimately increasing pressure on regulators. In the case of the Adelaide Hills, the South Australian EPA aims to reduce the frequency and severity of wheel squeal noise, rather than setting specific dB targets. Noise monitoring equipment was installed by the rail industry at Heathfield in the Adelaide Hills. It is a joint responsibility of both the rolling stock operators and the track owner to work towards a noise reduction strategy.

ARTC is keen to see some level of standardization of planning regulations for Local government across South Australia to ensure that that noise abatement strategies are arrived at through planning avenues, e.g., buffer zones could be established for development applications and soundproofing standards for houses affected by rail noise could be included in the Building Code of Australia.

(Source: ARTC)

### **Vignette #3: Private rail operator's self-regulation in dust mitigation**

Under the Western Australian Mines Act 2004, stringent OHS requirements are set out regarding exposure to dust, yet there are no safety requirements pertaining to the transportation of materials by rail. The West Australian Mines Department has been heavily involved with reducing dust at the mine site, but not in the transportation of the mined materials. In Western Australia, train operators do not need a licence to operate. As a result, environmental standards fall only under general environmental regulations, or indirectly through development approvals at a Council level.

Rio Tinto has developed a range of self-regulatory measures designed to mitigate dust. The company has ascertained community views regarding dust and noise emissions through quarterly community forum groups and monthly meetings in Western Australian towns affected by rail operations, and also by establishing a 1800 phone number for complaints. These initiatives provide insight into community views, which assists the development of self-regulatory measures. To follow up, complainants are visited by the relevant operating manager (a senior position within the organization) to discuss the initiatives that Rio Tinto is undertaking. This demonstrates to the community that the company is proactive in addressing the issues.

(Source: Rio Tinto)

### **Vignette #4: Minimization of dust-emissions from coal trains at QR Limited**

The overriding obligations of QR Limited in relation to the potential impacts of fugitive dust emissions from coal transport are defined under the *Environmental Protection Act (1994)*, which is overseen by the Queensland EPA. The Act specifies that all reasonable and practicable steps must be taken to minimize environmental harm. While 'harm' is partly defined in quantitative terms by air quality goals that would provide guidance for industry, the Act also refers to 'environmental nuisance'—a highly subjective term. In the past, coal dust has been considered a 'nuisance' dust. Although it is most likely to remain regulated as a 'nuisance', additional air quality parameters for particles are likely to be introduced.

Environmentally Relevant Activities (ERAs) are defined in Schedule 1 of the Queensland *Environmental Protection Regulation 1998*, which is part of the 'Act'. This regulation remains the primary legislative tool for assessing and managing activities that cause point-source pollution<sup>8</sup>. Organizations undertaking ERAs are required to hold a development permit and a Registration Certificate and must abide by the conditions of the permit and certificate. The transportation of coal is not defined as an ERA, which means that the majority of QR

<sup>8</sup> A single point of pollutant discharge; e.g., emissions from a furnace stack or dust extraction flue.

Limited's coal operations are not regulated as an ERA. However, Registration Certificates for three ERA sites affected by coal transport are held by QR Limited.

The Queensland Environmental Protection Agency (EPA) requested QR Limited to conduct an Environmental Evaluation (EE) of fugitive emissions of coal dust. A report was subsequently undertaken by Connell Hatch on behalf of QR to evaluate the impacts of coal dust. The EPA found that, while dust emissions from QR trains in Central Queensland do not exceed quantitative air quality standards, they are a source of dust and have the potential to cause an environmental nuisance, and thus harm. As a result, QR has sought to self-regulate by implementing a 'Coal Loss Management Project' to minimize dust emissions.

(Source: QR)

It is evident, not least from the information provided above, that there is a multiplicity of regulatory regimes and styles of regulation covering rail operations (both rolling stock and track). There is also a multiplicity of regulation and regulatory practice for different individual environmental aspects (such as noise, vibration, dust, emissions, etc).

A particularly problematic area for rail is noise regulation. For example, the NSW DECC appears to be particularly active in imposing regulations, but also in initiatives to assist rail in managing noise, e.g., a three-year (2007-2010) program to help rail to manage its noise and vibration impacts. Regulating noise in isolation using quantitative targets can mean that other environmental issues such as reducing GHG and particulate emissions are overlooked. Apparent inconsistencies between the States are not entirely economically rational, at least where the costs are perceived to be higher than environmental benefits, particularly in light of potentially more effective ways to eliminate noise (i.e., source-point reduction). Since regulations at a Commonwealth level, such as those pertaining to carbon, are gearing up to discourage emissions (Australian Greenhouse Office, 2006), there is a clear business case for taking proactive steps to reduce GHG emissions.

As stated above, some environmental impacts (GHG emissions and energy usage) are being regulated nationally. Rail's other environmental impacts, such as noise, dust, waste and site contamination, do not appear to be of the same 'national environmental significance' (the only occasion when Commonwealth intervention is currently required). As a result, they are regulated at State level. Although the Environment Protection and Heritage Council (EPHC) maintains National Environment Protection Measures (NEMs) for most of these areas, they do not apply to rail, with the exception of the rail facility-based National Pollution Inventory (NPI).

Among other environmental issues, noise-related urban development considerations (i.e., planning and zoning) have not been regulated in a harmonized fashion. With regard to planning regulations and the encroachment of development adjacent to the rail corridor, other than the NSW SEPP (which includes specifications for noise mitigation), other regulatory bodies address noise or dust mitigation in an inconsistent fashion, thereby causing uncertainty for owners and operators of transport infrastructure. Local Councils each have starkly inconsistent standards for development approvals. Different regions experience different effects from rail infrastructure and operations. Furthermore,



rail operators or track owners are culpable for mitigating dust and noise emissions affecting surrounding neighbourhoods, though some States have more relaxed noise regulations.<sup>9</sup>

With regard to dust, although industry has responded to community complaints, there is bound to be some level of pressure on regulators to further address this as more than a 'nuisance' issue owing to the increased volume of coal and other dusty materials being transported by rail. This could mean that State-based regulators will be required to take a proactive approach with regard to monitoring dust levels, or industry will need to shoulder the responsibility of developing standards. As recommended by both major heavy freight operators QR and Rio Tinto, operators need to engage with potentially affected communities and aim to limit the impact of dust and noise through self-regulatory measures. Co-regulation also emerges as another possibility. Evidence of co-regulation of environmental impacts was found in relation to the Greenhouse Challenge Plus (GCP) program. Some regulations were also developed in close consultation with industry, e.g., the National Greenhouse and Energy Reporting (NGER) system.

#### 4. Moving towards change

As should now be clear, there is considerable jurisdictional inconsistency, in addition to areas where important environmental matters are not adequately safeguarded. A call for a more harmonized approach emerges, especially where rail infrastructure owners and operators are conducting business in multiple jurisdictions, as has occurred with increasing frequency since rail deregulation (Everett, 2006). Harmonization of regulation is ultimately about two issues: (1) achieving more administrative efficiency (i.e., reducing paperwork through consistent processes within consistent frameworks), and (2) improving environmental regulations (improving environmental outcomes and consistency in practice) as a means to optimize economic and environmental benefits. Both issues involve change. To understand the pressures for and against changing the environmental regulation of the rail industry, a force-field analysis can be used. This analysis points to the following change factors:

Forces Driving Change
1. Growing political involvement in environmentalism
2. Calls for national transport policy and consistency
3. Growing task of railways
4. Calls for more optimal harmonization of government rail regulation
5. Calls for self-regulation by rail industry
6. Need to mitigate climate change through use of more fuel efficient transport modes, such as rail
Forces Against Change
1. Existing government regulation of external environmental issues, i.e., noise and energy
2. Problems with abatement of external environmental issues, i.e., noise and energy
3. Jurisdictional rigidity resulting from the federal system of government
4. Rail industry fragmentation of industry
5. Regulatory fragmentation of rail in safety accreditation, access, economy, OH&S and environment

<sup>9</sup> A paper based on additional research conducted for the *Environmental Regulations* project is to be presented on this topic at the *Competition and Regulation in Network Industries (CRNI) Conference* to be held 28 November, 2008 in Brussels.

(Source: Von der Heidt et al., 2008, p. v)

Forces outside the industry tend to be more difficult to manage, such as Australia's federal system, government policy on environmentalism and transport, government's responsibility for regulating environmental externalities, and recognized difficulties in the abatement of environmental externalities (Kvendokk et al., 2004). Clearly, internal (industry) factors are more controllable and, hence, more conducive to change.

Harmonization of environmental regulations could potentially be achieved by the following means:

- Working toward overcoming industry fragmentation through appropriate forms of industry cooperation on the matter of regulation (which could perhaps lead to guides to leading practice designed to overarch existing regulatory disparity).
- Strengthening industry's capacity to self-regulate by moving beyond quantitative regulatory targets.
- Strengthening industry's calls for more optimal government frameworks, processes and regulations.

The ability of industry participants to work through the issues collaboratively within the industry and, later, with appropriate regulators in a co-regulatory manner will determine the degree of success in any change initiatives. Greater involvement of the industry in the policy formation process, in addition to greater commitment to adopting leading practice regardless of current regulation, is required.

It is possible that the Commonwealth will not actively move towards a nationwide approach to dealing with the current irregularities. Yet the threat remains that public or NGO pressure may force government to implement strict black-letter law that could unduly hamper rail operations. A failure to act on the part of industry could thus lead to precipitate outcomes over a timeframe not conducive to fostering improved relations between industry and government. In view of this, a more forthright stance on environmental management through either co-regulation or self-regulation is required. In this context, the ARA's Rail Industry Environment Committee (REIC) draft environmental KPIs (2008) represent a necessary foundation for the rail industry to demonstrate that it shares the concerns of the wider public regarding the careful management of a range of environmental issues.

Co-regulation may thus represent one way to achieve greater consistency in the overarching context of Australia's federal system (Von der Heidt et al., forthcoming). A starting point could be to develop clear industry-wide standards for each of the specific environmental areas within the industry. A number of recommendations to ameliorate the currently dysfunctional system will be made in the forthcoming *Inventory*. These specific recommendations will be made available to members of the Rail CRC. At the risk of putting forward an empty 'motherhood' statement, the ability of industry participants to work through the issues in a collaborative fashion, and then with the appropriate regulators, will determine the degree of success reached by any change initiatives. Industry has a significant role to play with respect to challenging the government to affect change, rather than merely being a passive body that is happy enough to be consulted regarding environmental issues. This process is inevitably longer and more fraught with uncertainty than traditional top-down

government regulation, yet it would ensure that industry needs are best met, all the while ensuring that appropriate environmental outcomes are realized.

To conclude, there are several worthwhile and feasible options to improve current environmental regulation, policy and practice. These will be made clearer towards the end of the research process. It stands to reason that a *complete* renewal of existing environmental regimes is not required. There is clearly no point in re-inventing the wheel. Rather, a range of measured improvements have the potential to be achieved at a number of levels. These include firm and industry self-regulation, industry and government co-regulatory approaches, and inter-governmental cooperation and harmonization of one or more regulated areas. It is the intention of the project team to expand on these possibilities in forthcoming research outputs. Many benefits can be achieved with regulators and railways working together, rather than in an adversarial context, to achieve consistent practice within existing frameworks.

### **Contact**

For further information on this project, please contact either:

Michael Charles (Project Leader)  
 Southern Cross University  
 Ph: (07) 5506 9383  
 Mob: 0418 752 920s  
 Email: [michael.charles@scu.edu.au](mailto:michael.charles@scu.edu.au)

OR

Rachel Ryan (Senior Research Assistant)  
 CRC for Rail Innovation  
 Ph: (02) 8202 2536  
 Mob: 0412 591 105  
 Email: [Rachel.Ryan@railcorp.nsw.gov.au](mailto:Rachel.Ryan@railcorp.nsw.gov.au)

### **References Used:**

- Everett, S. (2006). 'Deregulation, competitive pressures and the emergence of intermodalism'. *Australian Journal of Public Administration* 61(3): 19-26.
- Kvendokk, S., K. Rosendahl and T. Rutherford (2004). 'Climate policies and induced technological change: which to choose, the carrot or the stick?' *Environmental and Resource Economics* 27(1): 21-41.
- Majone, G. (1994). 'The rise of the regulatory state in Europe', *West European Politics* 17(3): 77-101.
- National Transport Commission (2008). *Rail Productivity Issues Paper*. National Transport Commission (NTC), August.
- Productivity Commission (2006). *Road and Rail Infrastructure and Pricing*, Inquiry Report 41 (Canberra: AGPS).
- RIEC (2008). *Environmental Objectives and Key Performance Indicators – Draft*. ARA. 31 July.

- Sloman, J. & K. Norris (2008). *Principles of Economics* (Frenchs Forest, NSW: Pearson).
- Von der Heide, M.B. Charles, R. Ryan and B. Hughes (2008, forthcoming). 'Managing environmental regulations in the 21<sup>st</sup> century: challenges and opportunities', *2008 Australian and New Zealand Academy of Management Conference—Managing in the Pacific Century*, 2-5 December, University of Auckland.
- Von der Heide, T., R. Ryan, M.B. Charles, R. Zito, C. Collier, B. Hughes and R. Piamsa-Art (2008). *Environmental Regulations Pertaining to Rail: Towards a Case for Change* (Brisbane: CRC for Rail Innovation).