

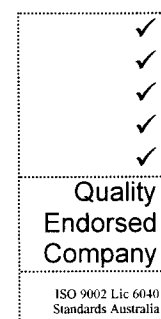
PRODUCTIVITY COMMISSION

Inquiry into Progress in Rail Reform

Submission by the

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3. NATIONAL RAIL

Formation of National Rail was a key policy initiative endorsed by the Industry Commission

The Industry Commission endorsed the formation of National Rail (*Industry Commission 1991*), concluding: “The NRC should help to increase efficiency through an integrated approach to the freight task, large productivity improvements and the possibility of competition” (p 316; for events leading to the incorporation of the National Rail in 1991 see *Industry Commission 1991*, Appendix D, pp 34-36).

In Appendix A we have attempted to compile the main expectations of the Commission regarding National Rail at the time of its formation, with our comments on outcomes achieved. Detailed information on these outcomes is presented in further tables below.

Benchmarking studies conducted since 1992 provide a basis for assessment of progress by National Rail in addressing the performance issues which lead to National Rail’s formation (*see Bureau of Industry Economics 1992, 1993 and 1995, Travers Morgan 1991, Steering Committee 1993 and 1997, Ernst and Young 1990 and 1998*).

There has been progress in financial performance, but less than projected in 1990

There has been a significant turnaround in the financial results of the business since 1990/91, shown in Figures 3.1¹ and 3.2².

It is estimated that the total cash saving to date benefiting Australian governments, and therefore taxpayers, from loss reduction by National Rail, has been close to \$500 million, after taking full account of shareholder equity committed to the company.

The company has reduced the annual loss incurred by the business by almost 94 per cent since 1990/91, and was modestly cash positive in 1997/98. In 1997/98 the negative operating margin was reduced. Revenue and productivity initiatives are expected to improve these figures in future.

¹ Source: *Ernst and Young 1990*.

² Source: National Rail Corporation Ltd, *Annual Report, 1997/98* (confidential until 19 November 1998) (*NRC 1998*).

Expectations at the time of National Rail's formation were that the company would be profitable inside the five-year Establishment Period, which ended on 31 January 1998. Productivity has moved upwards in line with expectations (see below), so the question must be asked why has profitability not followed? There are several reasons:

- Competition from new rail operators in the east-west corridor occurred sooner than anticipated, in mid-1995. The effect was to reduce revenue yields as well as volume for intermodal freight (no new rail business was generated by these competitors). National Rail was able to reduce expenditure by an amount similar to the drop in revenue, but the cumulative effect of deteriorating yields over three successive years has kept operating margins negative. Further productivity gains are occurring aimed at producing positive operating margins and profitability.
- Depressed economic growth has also affected volumes on all National Rail services, in spite of growing market shares in all business groups other than Intermodal.
- The quality of assets available to the company at the commencement of operations, particularly locomotives, was worse than anticipated. The average age of the locomotive fleet made available for by rail authorities in 1993 was over 20 years. The very high level of in-service failures and frequent capacity shortages were key factors in National Rail poor service quality up to mid-1997, and a major stimulus to on-rail competition. Wagons were also subject to high failure rates, but transfer of the wagon maintenance and deployment functions in 1994 made possible a total fleet rehabilitation program, which was carried out at National Rail cost.
- The locomotive maintenance and deployment functions were not transferred to National Rail by rail authorities until 1997. National Rail was therefore unable to lift the quality of maintenance, fleet availability and capacity. In September 1995 National Rail contracted for delivery of 120 new locomotives for delivery in 1996/97. By May 1997 the benefits in improved capacity and reliability were clearly evident, and during FY1997/98, benefits from reduced operating and maintenance costs have also begun to come through.
- Poor quality of track infrastructure has also affected operating reliability and costs. At National Rail's formation it was agreed the company would control the interstate track, and National Rail nominated the relevant assets in successive corporate plans. However, in 1995 shareholders decided the track would not be transferred. National Rail has therefore been unable to lift the quality of track by accelerated maintenance programs as occurred with other transferred asset types, or to carry through early planning for new investment.

National Rail's financial results became a realistic reflection of the company's performance only in 1996/97 and 1997/98. Up to 1995/96, National Rail did not bear the full cost of all services at prices determined by the Shareholders' Agreement provided until that time by the five rail authorities which controlled the business before 1993/94; details are in National Rail's annual Financial Statements. The company also received compensation ('wedge') payments under clause 5(4)(b) of the Shareholders' Agreement; these ceased as from 1 February 1998.

National Rail average cost for freight has reduced by 42%, and productivity is now at or close to 'world best practice'

According to a recent benchmarking investigation of National Rail by Ernst and Young, "in most expense categories National Rail is performing in the vicinity of world's best practice". (*Ernst and Young 1998*) Details are shown in Table 3.1

The results of benchmarking shown in Table 3.1 indicate productivity increases of between 31% to 575%, yielding an overall reduction in average costs since 1989/90 of 42 per cent.

Major initiatives to increase productivity have included:

- A *greenfield* start-up, with employees, functions and assets being selected by National Rail in line with planned requirements. The number of employees in the company is now approximately 1,300, in contrast to more than 9,000 before National Rail, according to estimates made in 1990.
- Outsourcing of most non-core functions, including locomotive maintenance, some wagon maintenance, terminal equipment maintenance, IT development and operations, track access, and a

range of corporate functions. It is estimated these activities employ the equivalent of 460 persons (*Ernst and Young 1998*).

- Purchase of 120 new locomotives, to obtain the benefit of lower fuel consumption, lower maintenance costs, and greater horsepower (facilitating longer trains).
- Purchase of new low-tare wagons, which have raised available payload by up to 90 percent.
- Upgrading of terminals and terminal equipment for more efficient train loading and unloading
- Financing of longer crossing loops and building longer terminal tracks for operation of longer trains. The near-term target is 1,500 metres.
- Continuous review of train operations to match capacity with demand, taking account of customer preferences for cut-off and freight availability times.
- Continuous improvement programs to reduce fuel consumption, improve the efficiency of driver rosters, reduce the cost of wagon maintenance, reduce lost time injuries, and improve customer service.
- Development of new IT systems for freight, terminal, train and maintenance management and on-line freight bookings and information for customers (the chart on page 7 provides an overview of National Rail's IT systems).
- Installation of AEI (automatic equipment identification) track-side readers in 47 locations on the network, as a vital component of train management systems.

Table 3.1: Benchmarking National Rail productivity to 1997/98³

	National Rail		Best Practice (Generally USA) ⁴
	FY1989/90	FY1997/98	
Cost per NTK <i>Cents/NTK (before non operational items and abnormals)</i>	5.4	2.9	n.a.
Employee productivity <i>NTK / employee</i>	1.6	11.7	12
<i>NTK/employee (includes NR outsourced)</i>		9.2	
<i>Labour percent of revenue (%)</i>		23.1	33
Fuel consumption (<i>consumed per 000 GTK (litres)</i>)	n.a.	4.04	3.35
Locomotive maintenance cost (\$/locomotive-km): 4,000 hp (NR and AN class)	2.8 est.	0.80	0.75 ⁵
3,000 hp		1.59	1.80
Locomotive utilisation <i>(million GTK/locomotive pa)</i>	108	201	n.a.
Wagon maintenance cost <i>(\$/000 km)</i>	n.a.	38.8	40-42
Wagon utilisation (<i>million NTK/wagon pa</i>)	2.1	3.9	5.0 ⁶
Wagon availability <i>(% of time available for traffic)</i>	n.a.	98.0	na
Corridor access <i>(% of total operating expenses)</i>	19.2	22.0	16.9
<i>(\$/000 GTK)</i>	4.80	3.28	n.a.

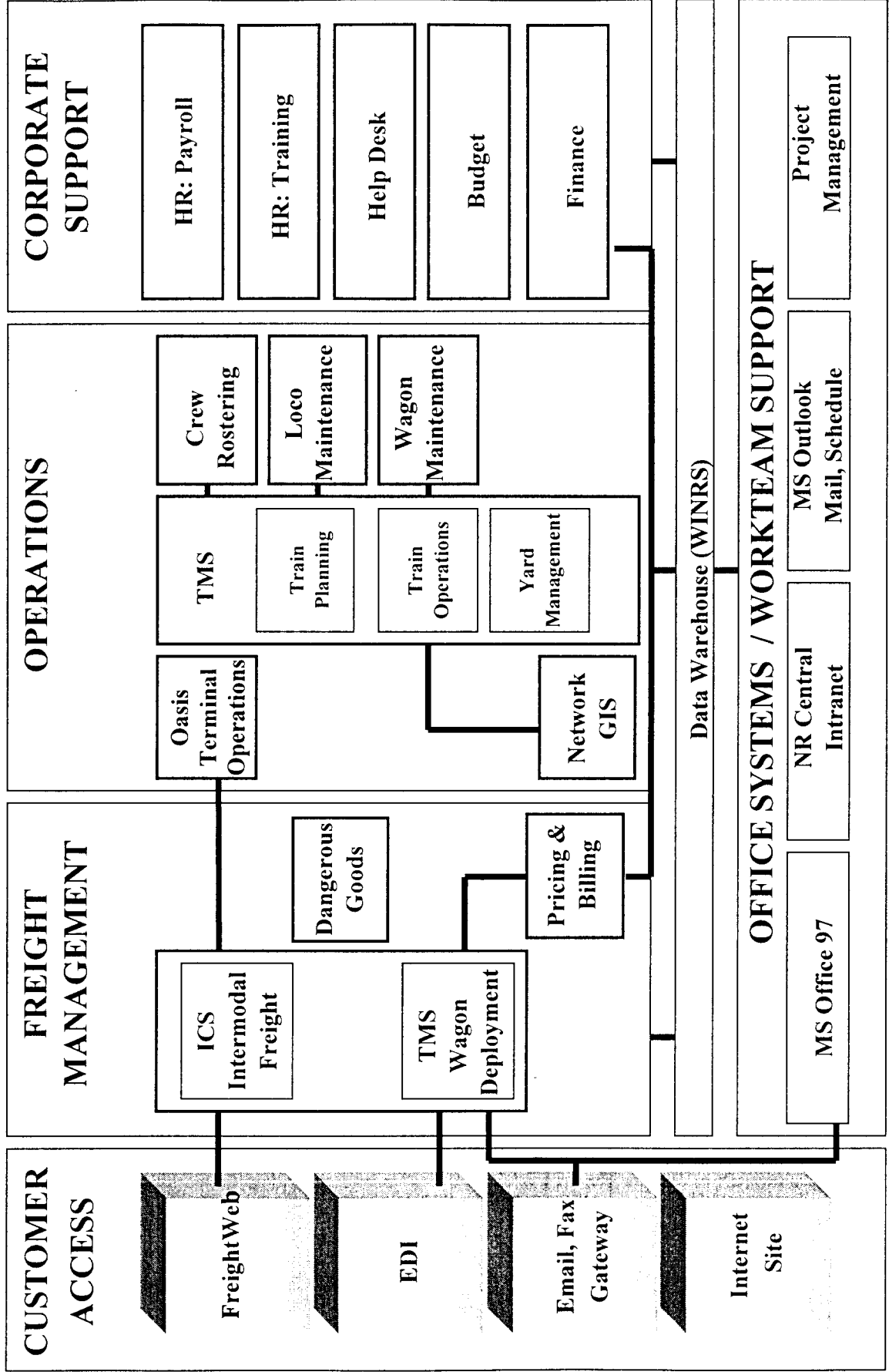
³ Sources: Travers Morgan (1991), Ernst and Young (1991), Bureau of Industry Economics (1995), National Rail.

⁴ Based on the best of Burlington Northern Santa Fe, Chicago and North Western, Southern Pacific, Conrail, CSX, Norfolk Southern, Union Pacific, Wisconsin Central (*Ernst and Young, 1998* p 9).

⁵ Benchmarks for locomotive and wagon maintenance established by Travers Morgan in confidential report on *Standard Costs*, June 1995.

⁶ Union Pacific Railroad, 1993/94; the Canadian Pacific Railway with more comparable operating conditions was 3.0 in 1993/94 (*Bureau of Industry Economics 1995*, p 61)

National Rail Integrated Application Architecture



National Rail has also installed an in-motion weighbridge on the east-west mainline, to assist in detecting defective and over-mass axles and wagons on National Rail trains. This is the only such device on the standard gauge interstate mainline. Such devices are also capable of delivering significant benefits to track owners.

Prices for National Rail services are (on average) close to world best practice

“Australian rates for general freight closed the gap to best observed overseas rates in recent years. NRC reduced the average rate for general freight customers by 16 percent [to 2.87c/ntk] in 1994/95” (*Bureau of Industry Economics 1995*, p xiii) Average revenue per unit of freight task fell farther to 2.81c/NTK in FY1997/98 (National Rail audited accounts, 1997/98), bringing the total reduction in average price to 17.6 per cent since 1993/94.

Freight rates have been restructured to match cost structures , remove discrimination, and encourage quality service delivery

Figure 3.3 shows an examples of the intermodal rates structure before and after removal of discrimination and restructuring to reflect relative costs for both mass and volume. For industrial commodities such as steel and mineral concentrates, agreements now exist with customers aimed at building quality-based relationships; these include revenue penalties for non-performance on a range of agreed performance indicators. Freight forwarders have been offered similar agreements, but competition in this market has discouraged forming long-term relationships.

Figure 3.3A: National Rail Rates - Before Reform
Example: Chullora-Dynon 14.2 m

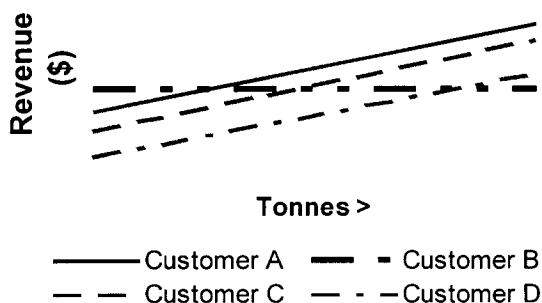


Figure 3.3B: National Rail Rates - After Reform
Example: Chullora-Dynon 14.6 m



There has been a concentrated and successful campaign to lift customer service quality

Table 3.2 shows a number of measures of service quality. Measures of ‘world best practice’ or other benchmarks relating to service quality are very difficult to obtain. However, indicators developed in National Rail closely mirror those proposed by the Bureau of Transport and Communications Economics after interviews with rail customers (*BTCE 1996c*).

It is an article of faith in National Rail that ‘quality pays’. Some service quality indicators are not yet at desired levels, but there has been major progress in most. As a result of high levels of reliability, customer complaints about reliability of freight availability have virtually disappeared.

Until mid-1997, the level of service quality provided to customers, especially on-time availability of freight, fell far short of targets and far short of customer expectations. A number of actions were taken to correct this short-fall:

- Major re-equipment (locomotives, wagons, gantries and fork lifts)
- Asset rehabilitation (wagons)

⁷ Audited financial statements will be released in mid-November 1998.

- Development of a suite of new IT systems for freight, train and resource management and customer communications
- ISO 9002 certification by all sites in the company, and the company as a whole
- Development (and daily use) of very extensive ISO 9002 compliant procedures documentation for all train, terminal, maintenance and administrative processes.
- Continuous improvement projects (eg container damage reduction, customer communications, load securing), involving development of procedures (for internal and customer use), training and management information.
- A new customer information system, Internet-based FreightWeb, which provides customers with near real-time information on consignment status)
- Pro-active customer communications in the event of major and minor service failures (eg major flooding in 1996 and 1997)
- Employee communications emphasising the value of excellence in customer service.
- Culture development, supported by all of the above.

Table 3.2: National Rail customer service quality indicators – 1997/98

Measure of Service Quality	Indicator Value FY1997/98
On-Time Freight Availability	<i>(% of services on time [± 0 minutes])⁸</i>
Intermodal	91.0
Trailerail	91.0
SteelLink	97.0
SeaTrain (dedicated Port Botany-Brisbane daily service)	97.0
Passenger trains	n.a
Container damage	<i>(% of containers consigned)⁹</i>
Containers left behind	<i>(% of containers consigned)</i>
Truck turnaround in intermodal terminals	<i>(% ≤ 30 minutes)</i>
	<i>(Average Minutes)</i>
	<i>(Minutes for 90th %-ile)</i>

Quality risk management programs have reduced occupational health and safety incidents

For three successive years (1995/96, 1996/97 and 1997/88), the number of lost-time incidents affecting National Rail employees has steadily declined. The number of lost time incidents was reduced from 32 per million hours worked in 1995/96 to 26 in 1996/97, and to 22 in 1997/98.

Risk management strategies include:

- Health and safety committees at each work site and a national rail safety committee chaired by the Managing Director, which manage identified risk factors, and monitor all incidents
- Reporting and investigation of all significant incidents, under the leadership of the company's National Operations Manager Quality and Safety.

⁸ 'Freight availability' is a measure of when the first container is 'available' for unloading onto a customer's truck. In measuring this indicator of service performance, no tolerance is included, in contrast to the traditional ± 30 minutes applied to measures of on-time train arrivals.

⁹ It is not possible to calculate the *value* of freight damaged, as has been proposed by some analysts (eg *BTCE 1996c*), as the contents of containers are unknown unless they are dangerous goods.

- A major driver fatigue management program, which includes evaluation of all planned rosters by means of a fatigue index, which prevents excessive blocks of on-time and night shifts, and assists drivers and their families to manage non-work time.
- An employee awareness program called 'Staying Alive'.

Competition has dramatically affected National Rail's business

"The commercial environment which now applies to the rail industry, and to National Rail in particular, is highly competitive" (*Ernst and Young 1998*, p 10). One consequence is the very low level of rates for general freight, which on average are only one-quarter those in New Zealand.

National Rail is subject to the *Trade Practices Act 1974*, including Part IIIA, which provides for competitive access to interstate corridors by new entrants to the rail business.

Road transport is the most powerful competitor for rail general freight services. B-Doubles are a continuing threat to the viability of rail transport. Productivity gains achieved by rail, at considerable capital cost to rail operators and infrastructure providers, are being delivered to road transport by a massively financed national highways program, which requires no extra contribution from its road transport beneficiaries.

Competition from B-Doubles has been the strongest on the east coast, and National Rail's program of locomotive and wagon fleet replacement, financed from equity and debt, and infrastructure upgrading, also financed by National Rail, is aimed at reducing costs to be competitive in this corridor. The advantage gained by this investment would be reversed in favour of road transport by the reduction of diesel fuel excise to 18c/litre for road and rail; even with elimination of the excise for rail (and retention of 18c/litre for road transport would leave rail substantially worse off than at present.

Beginning in mid-1995, a number of on-rail competitors have established interstate freight services, first in the east-west corridor (Melbourne-Adelaide-Perth), and recently in the north-south corridor (Melbourne-Sydney-Brisbane). A price war has occurred in the east-west corridor, resulting in significant price reductions, but no net addition to freight carried by rail. National Rail revenue has been severely affected by the competition, contributing to delay in achieving profitability on the timetable envisaged in 1991/92.

Competitors in the east-west corridor operate rail services largely as an adjunct to broader forwarding businesses, and achieve high equipment utilisation by holding back freight to make up full trains. National Rail operates scheduled services with advertised freight availability times. 'Non-scheduled' services cannot offer the levels of quality delivery performance demanded by most customers.

National Rail has developed new products and markets to expand market share and revenue

National rail has developed an number of new services and markets to expand its revenue base in the face of massive competition both from road transport and other rail operators. Success in this regard has been notably greater in the past 12-15 months as the superior quality of service offered by National Rail has become better recognised in the marketplace.

Some examples of new products and markets being served from the past twelve months are:

- ***NQ Direct*** is operated jointly with Queensland Rail and links North Queensland with southern points. This is a direct service — so there is no need for reconsigning in Brisbane. It has experienced rapid growth, especially since service upgrading in July 1998, which saves one market day for freight into southern fruit markets. *NQ Direct* is a temperature controlled service operating five services a week from North Queensland to southern capitals and three services northward each week. Freight is available in Sydney on the third morning and in Melbourne on the fourth morning.
- ***Auto carrying***: During 1998, National Rail has put car transport partially back on rail in the east coast corridor. Two services are involved, one operated with TDG Autocare and other with TNT Automotive Logistics, both Melbourne/Brisbane, and both use specialised enclosed unit loads. TNT Cartainers (15.5 m long x 3.2 m high) are used in conjunction with low profile

wagons to enable stowing of vehicles two-high. Since 1989, rail has only carried cars Adelaide-Perth where National Rail has 85% of the market. This service uses triple-deck partly enclosed car carriers.

- **SeaTrain**, National Rail's landbridge service between all capital city ports, offers value added services, including customs bonded storage, on-ground power for reefer containers in storage, on-train power for reefers in transit (PolarPak), and E-commerce capability. There is also a dedicated SeaTrain landbridge both ways daily between Brisbane and Port Botany (Sydney). Dedicated personnel are located in Brisbane, Port Botany, Melbourne, Adelaide and Perth.
- **Great Southern Railway passenger trains**: In November 1997, when three ex-Australian National long-distance passenger services were purchased by GSR from the Commonwealth, a competitive 'hook and pull' contract was awarded to National Rail. This has been successful, and levels of reliability have been excellent.
- **Furniture removals** are a growing market for National Rail, with a substantial number of removers now consigning furniture and other household effects on intermodal services.
- **Western Sprinter**, commencing in October 1998, offers later cut-off times out of Sydney and will reduce the Sydney-Perth transit time to 3 days. This is creating another opportunity for National Rail to attract traditional trucking business onto rail.
- **Trailerail's premium bi-modal service** linking Melbourne, Adelaide and Perth, has been growing at a rate of approximately 17 per cent per year since start-up in 1994. Near the end of 1998, it will be starting a new service between Sydney and Perth. So before the end of 1998, National Rail will be offering three levels of intermodal service out of Sydney to the West — Superfreighter, Sprinter and Trailerail.
- **McGrath Newcastle** is a service operated jointly with freight forwarder Sadliers Transport, to tap the Newcastle market, with an emphasis on Perth freight. Road transport from Newcastle links with National Rail trains at Sadliers LCL depot in Enfield (Sydney).
- **At Parkes NSW FCL Interstate Transport** has established an intermodal rail to tap into traffic from the NSW hinterland. Containers of freight from this area are loaded onto National Rail Sydney-Perth trains at Parkes.
- **Australia Post mail to Perth** is being carried by National Rail in conjunction with FCL Interstate Transport – the first mail to be taken from road transport since the late-1980s.
- **Competitively-priced bids** have also been submitted for other business with an emphasis on quality freight service (eg SA's Optima Energy Corporation tender call for coal transport).
- **FreightWeb** is National Rail's major initiative to provide customers with on-line access to business information and on-line services. It enables on-line booking of containers (with telephone assistance where required), consignment tracking and account status information. National Rail has installed IT equipment in customer premises, and customer clerical and transport staff have been given extensive training.

National Rail is creating a new business focussed workplace culture

National Rail was named *Employer of the Year* in 1998, the top award given by the Australian National Training Authority. Although the award was specifically directed at training programs, it was reflection of the attention given by National Rail to creating a business-culture in which the emphasis is on innovation, skill development and commitment to quality.

The emphasis on commitment to quality service delivery is especially strong in the leadership given to employees, and this is clearly paying off in results. National Rail conducts bi-annual surveys of employee attitudes, benchmarked against Australian industry and international transport industry norms. These have confirmed strong commitment to service values.

4. ISSUES OUTSIDE NATIONAL RAIL

Major external issues have adversely affected National Rail's progress

The value to the national economy of the reforms made through National Rail is being substantially diminished by a number of factors outside the company's direct control:

- The poor quality of much of the infrastructure in rail corridors, owing to deferred maintenance and lack of investment in upgrading.
- The high cost of infrastructure access – ten times the level paid by competing trucks to carry the same amount of freight.
- A multiplicity of regimes for commercial track access on the 'national rail highway', matched by a multiplicity of track owners (private and public), each with a different approach to terms, conditions and pricing of access, and none willing to be accountable for the quality of access provided.
- An overly complex State-based 'system' of safety regulation, with State legislation providing the backing for separate regulators in each state. This is compounded by track access providers (and in NSW also the environment protection authority) seeking to provide a second line of 'safety' regulation
- Costs caused by lack of harmonisation of operational rules, operating practices and related infrastructure (eg signalling and communications).
- The increased risk to operational safety which has accompanied 'vertical separation'. In a number of states, rail operations are conducted by organisations which are totally separate from those providing infrastructure management and train control; risks have been aggravated by entry of new and inexperienced players.
- The inability to obtain approval to carry intrastate freight in several states.

Governments' economic policy priorities for rail must be (1) efficient investment in land transport infrastructure, (2) efficient pricing of access to land transport infrastructure, and (3) harmonised and simplified regulation of access and use of rail infrastructure

In the opinion of National Rail, these are the areas of policy where the major issues remain to be successfully addressed.

The poor quality of infrastructure used for interstate rail operations increases the cost of rail operations and affects service quality

This has become the single largest issue for the industry. The poor quality of rail infrastructure has received extensive attention in several inquiries, most recently by the bi-partisan Neville Committee, which said that "without urgent and substantial investment in this infrastructure, major sections of the track network are likely to become irretrievable within ten years".

The rate of investment in the *national rail highway*, with not more than \$65 million per year currently planned for the next four years, is less than one-tenth that being expended on the national road highway. The Neville Committee recommended Commonwealth Government leadership and a large program of investment to address this issue.

The poor quality of interstate rail infrastructure is a legacy of many decades of neglect by State governments, and has many aspects:

- Obsolete alignments largely designed and built in the last century; these restrict speed and therefore transit time (a critical factor in intermodal competition), and increase fuel consumption and track access charges (which are generally based on a mass-distance formula)
- Obsolete signalling and communications equipment on much of the network, which slows average speeds and reduces capacity on some parts of the network. There are currently 24 different safeworking systems (most of which require differing and/or outdated equipment for their operation) and nine different radio systems on scores of frequencies in operation across the national network (see Appendix B).
- Short crossing loops, which limit the train length, which is a major factor in operating costs

- Inadequate height clearances, which prevent double stacking of containers in east coast corridors linking Adelaide, Melbourne, Sydney and Brisbane where trucking competition is greatest
- Inadequate track strength owing to under-design for today's potential carrying capacity; the effect is to limit maximum permissible axle masses of rail wagons to 19-21 tonnes on the interstate main line (in the USA main lines are built to accommodate 30 or more tonnes per axle, providing extra payload capacity of 40 tonnes per wagon, yielding massive additional revenue at marginal cost).
- Poor quality track structure resulting from deferred maintenance; this further aggravates transit times by imposing 'temporary' speed limits.

Lack of investment to address these issues has deprived rail operators of most opportunities to lift train productivity levels. Investment in the national highway system has been a major driver for productivity improvement in the road transport industry, which has been closely linked with increases in vehicle mass and dimension and limits.

National Rail is cooperating with the NSW Rail Access Corporation to facilitate financing of crossing loop extensions for operation of longer trains; so far similar arrangements have not been possible in other states. No funding is available for infrastructure to facilitate increasing axle mass limits or eliminating height clearance constraints.

With the formation of the Australian Rail Track Corporation Ltd (ARTC) in July 1998, limited initial planning has been undertaken to assess investment needs on and potential returns on a network basis. However, the funding available to the ARTC is not sufficient to finance more than half of the program of works assessed as immediately warranted by rail operators and recent economic appraisals undertaken for the ARTC. Comparative assessments of potentially competing road and rail corridor investments have not been undertaken, as no organisation exists with a mandate to do this.

Some important improvements in the performance of infrastructure can be successful with minimal capital expenditure

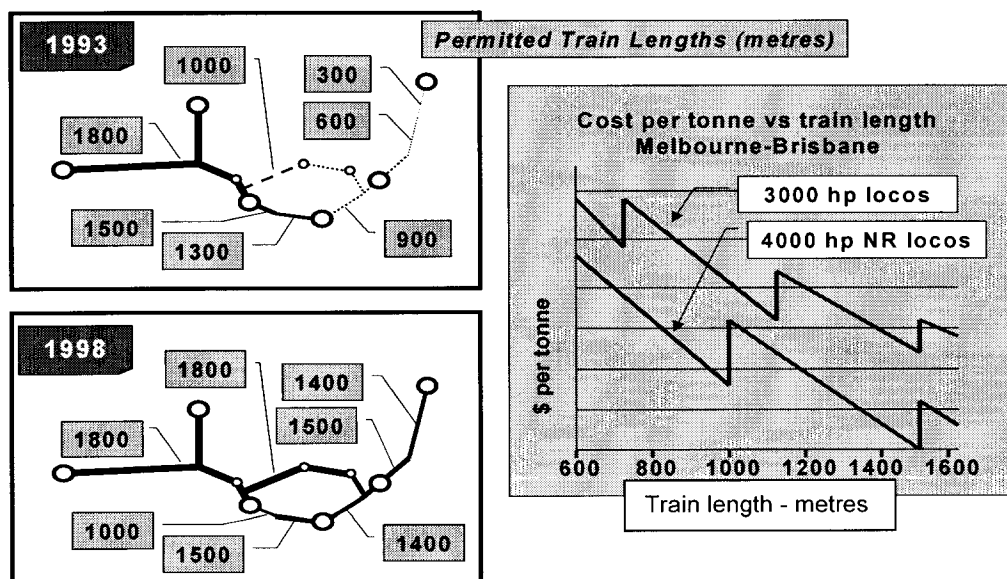
Substantial increase in the permissible length of trains on the east coast – a critical factor in train productivity – have occurred with minimal investment.

Investments required to make these changes secure and permanent will total \$58 million:

- \$23 million to extend crossing loops (funding by *One Nation* rail infrastructure program, 1993-95)
- \$19 million to extend/construct crossing loops between Melbourne and Brisbane (funding from National Rail through 'Project Reclaim', 1997-1999)
- \$16 million to construct new 1,500 metre operations sidings at Chullora.

The maps at Figure 4.1 shows the length of trains before and after improvements made in 1997/98, and the accompanying economics of train lengths.

Figure 4.1: Train lengths on interstate track, 1993 and 1998



A large part of the gains from increased train lengths have been achieved before implementation of the second and third elements of the program mentioned above, by changes in operating practices by the rail access provider, NSW Rail Access Corporation, which have facilitated passing and crossing of long trains on single track, by better management of trains paths and crossings.

Addressing all aspects of the infrastructure quality issue requires substantial catch-up maintenance and new investment

The scope for quick-fix low cost solutions of the kind described above is limited. Requirements for maintenance catch-up investment were discussed in National Rail's Neville Committee submission.

Private sector financing of investment in present railway corridors is not occurring

Private sector finance has featured in a number of actual or proposed investments in railway infrastructure. To date all of this finance has been targeted at stand-alone projects. None has been targeted at upgrading or augmenting the existing *national rail highway*. The principal obstacles to this appear to be:

- The *national rail system* has not been defined and there is no *national rail infrastructure plan* indicating to potential investors where benefits can be gained from investment at manageable levels of planning risk.
- Assets are owned by non-tax paying public sector rail authorities, providing no opportunities for earning taxation gains from structured investments.
- Ownership of the assets by public authorities also precludes equity financing of improvements.
- Risks associated with gaining planning and environmental approvals and access to land are also potential obstacles, but these are not unique to projects undertaken on public sector assets.

The Productivity Commission is urged to investigate and identify these obstacles more clearly through submissions from the finance sector.

To attract both public and private sector finance for rail infrastructure investment, there is an urgent need for a long-term national transport corridor plan, including plans for upgrading of a defined national rail system

Prerequisites to successful planning will be:

- Definition of a *national rail system*, including mainline and ancillary track and structures (crossing loops and mainline yards), and signalling and train control infrastructure. This will complement the existing definition of the national highway system. Included in this definition of the national rail system must be rail lines of national importance not on the mainline, serving key industrial areas and ports, complementing roads of national importance. The total length of track in use by National Rail is currently some 9,800 km.
- Establishment of a national body able to assess investment options on a cross-modal basis, comparing the gains from both rail and road investment. Expansion of the National Road Transport Commission into a "National Land Transport Commission" has been proposed for this purpose, and is to be considered this year by the Australian Transport Council.

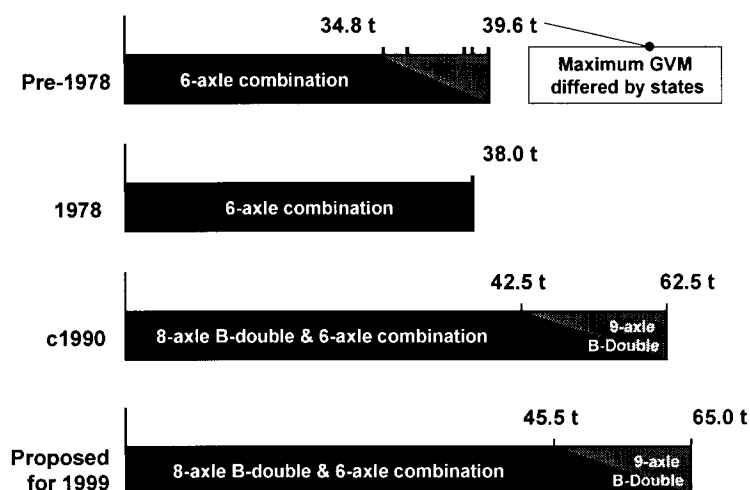
On the other hand, road transport has received successive productivity 'bonuses' from mass and dimension increases, without inter-modal comparative appraisal of alternative infrastructure upgrading or specific charges to recover extra infrastructure costs

In the rail sector, few works occur unless rail operators make direct contributions through access charges or capital contributions. Clearly this is an obstacle to investment and to productivity improvement.

During the past two decades there have been two major increases in road vehicle mass and dimension limits, and a third mass limits increase is currently being considered by the Australian Transport Council. These policy decisions have been the principal driver for productivity growth in the road transport industry. Legal gross vehicle mass for the most common large combination went from around 36 tonnes before 1978 to 42.5 tonnes in 1990, and is currently proposed to rise again to 45.5

tonnes. B-double combination vehicles were made legal progressively from the mid-1980s. These vehicles are currently able to operate at 62.5 tonnes maximum gross combination mass, and are proposed to rise to 65.0 tonnes gross. These changes have not required any direct capital contribution from operators. The changes since 1978 are illustrated below in Figure 4.2.

Figure 4.2: Increases in Gross Vehicle Mass Limits, 1978-1998



The National Road Transport Commission is required periodically to assess the rates for road use charges, in accordance with its legislative charter. However, the current charging system makes it virtually impossible to recover increased infrastructure costs from the classes of vehicles which impose extra costs on the road system through requirements for strengthening of bridges, upgrading of intersections and strengthening of pavements. This is because the definition of *heavy vehicles* used by the NRTC to calculate road use charges includes all vehicles above 3 tonnes GVM.

The high cost of access to rail infrastructure compared to road is damaging rail's ability to compete with trucks

The access charges to move 1,000 tonnes of freight from Melbourne to Sydney is currently \$5,585 for rail and only \$458 for road. The figure of \$458 is the relevant proportion of the heavy road vehicle registration fees (\$575 with the NRTC's proposed new registration charges (*National Road Transport Commission 1998*)).

This assumes the fuel excise of 18¢/litre is a *tax* common to both rail and trucking operations and not a *road use charge*. On the other hand, if the excise is considered to be a *road use charge*, and therefore an additional component of the "access charge", it can only be a charge for *road* use, as rail users are already paying specific charges to track owners for use of the rail 'highway'. In reality the fuel excise is widely considered to be a road user charge, although rail operators also pay it.

There is strong support for fuel excise as a road user charge

In its report, *Tracking Australia*, the Neville Committee recommended that the Commonwealth "develop a more consistent, equitable approach to transport infrastructure charges to ensure competitive neutrality between modes" (*PCA 1988*, p 125).

There is substantial support for the recognition of the fuel excise as a de facto road user charge, which would be reinforced by its reduction to 18¢/litre as proposed by the government's proposed tax reforms, and exempted for *all* off-road users, including rail. The proposal that the excise be pegged at 18¢/litre, implicitly acknowledges the widely held view that this amount is a road user charge – a view confirmed by the government's National Road Transport Commission.

In its 1992 determination, the Commission said that “18 cents per litre of diesel excise should be regarded as the ‘Road Use Charge’”. In its recent draft review of charges, the Commission has recommended that this be lifted to 20 cents/litre (*NRTC 1998*, p 11). This would recover some \$950 million from heavy vehicles, with \$440 million being recovered through registration charges. In aggregate these amounts are equal to the total allocated expenditure attributable to heavy vehicles on all roads in Australia (*NRTC 1998*, p 9).¹⁰

Clearly therefore, there is statutory backing for designating 18¢/litre fuel excise as a *road use charge*. This is consistent also with the exemption from fuel excise for off-road vehicles proposed by proposed tax reforms. It is inconsistent, however, with retention of the same level of excise for rail – also an off-road user – which should not be paying this *road use charge*.

This analysis is consistent with that of the Bureau of Transport and Communications Economics, which states that in effect there is ‘soft hypothecation’ of some of the present excise, including the road use charge determined by the NRTC and the excises on aviation fuel which are regarded as industry payments to ASA and CASA (*BTCE 1997*).

We do not see objections to formal ‘hypothecation’ as a major barrier to recognising the fuel excise a “road use charge”, as current practice endorsed by the NRTC does not require funding hypothecation, only notional identification of this charge as a part of the price paid for the use of road infrastructure.

The Industry Commission in its 1991 *Review of Rail* recommended that rail operations be exempted from the fuel excise. This was repeated in its review of the petroleum industry in 1994, where it stated that “the point of a charge for the use of roads is to improve road supply and use decisions. Transport decisions would be distorted if road user charges were applied to railways” (*Industry Commission 1994*). The National Transport Task Force made similar observations in 1994 (*NTPT 1994*, p 53).

The Road Transport Forum recently gave its support for abolition of the current diesel fuel excise and its replacement with a designated *road user charge*. According to a spokesperson for the RTF, “The challenge is to implement a 19 cent per litre road user charge”¹¹

The National Farmers Federation recently said it was disappointed the fuel excise was not removed completely and replaced with a road user charge. According to the NFF President, “we are also concerned that rail will continue to pay 18 cents a litre in excise, which means grain growers will continue to pay up to a dollar a tonne in unnecessary taxes on business inputs.” In the same context, the AAA (Australian Automobile Association), executive director said, “...fuel excise should be replaced by a road user charge to pay for roads, road safety and environmental costs related to road use”.¹² We support the position of the AAA that “the principle of applying a charge for the use of roads would be no different from that of charging for the use of electricity, water, gas and telecommunications” (*AAA 1998*).

This view is supported by the National Road Transport Commission. The NRTC has the legal responsibility for periodically recommending the levels of charges to be levied on heavy vehicles for their use of the nation’s roads. The *National Road Transport Commission Act* (1991) makes the Commission responsible for recommending Road Use Charges (heavy vehicle registration charges) and a Road Use Charge (fuel based charge) to the Australian Transport Council. The Commission states that “The current national road user charging system ... was a major step towards more rational pricing of road use by heavy vehicles in this country” (*NRTC 1988*). The first determination of charges was made in 1992 (adopted by governments in 1995 and 1996), and a draft second determination has recently been released for discussion. (*NRTC 1998*, p 2)

¹⁰ The NRTC has also proposed, in line with the views of the AAA, that future charging structures closely examine options taking account of the external costs of road use in determining charges for heavy vehicle use (*NRTC 1998*, p 17).

¹¹ Michael Apps quoted in the *Daily Commercial News*, 10 August 1998.

¹² Reported in the *Daily Commercial News*, 17 August 1998.

Recognition of the fuel excise by governments as a road use charge is Step 1 towards more rational pricing infrastructure pricing. Step 2 should be establishment of a charge based on factors which are directly linked infrastructure costs

While the fuel excise is a useful part of the current two-part charge for road use, it is not sensitive to the different between vehicle classes in the costs imposed on the road system for original construction and maintenance. The appropriate charging mechanism for Australian conditions should be the subject of careful investigation –by the proposed National Land Transport Commission.

The National Road Transport Commission has been responsible for determination of road use charges during the present decade. Its recent draft policy paper on road use charges (*NRTC 1998*) raises a number of issues about the structure and cost-base for road charging. In particular, it says it is investigating the use of ‘life-cycle costing’, which would be closer to the approach used for rail, of externalities (especially urban congestion, air and noise pollution), and the use of Global Positioning technology “to monitor truck travel for charging purposes... With the addition of load cell or related technology, it could provide the basis for a future mass-distance charging system.” (p 17). These statements indicate the potential for a very thorough examination of land transport infrastructure pricing, spanning both road and rail.

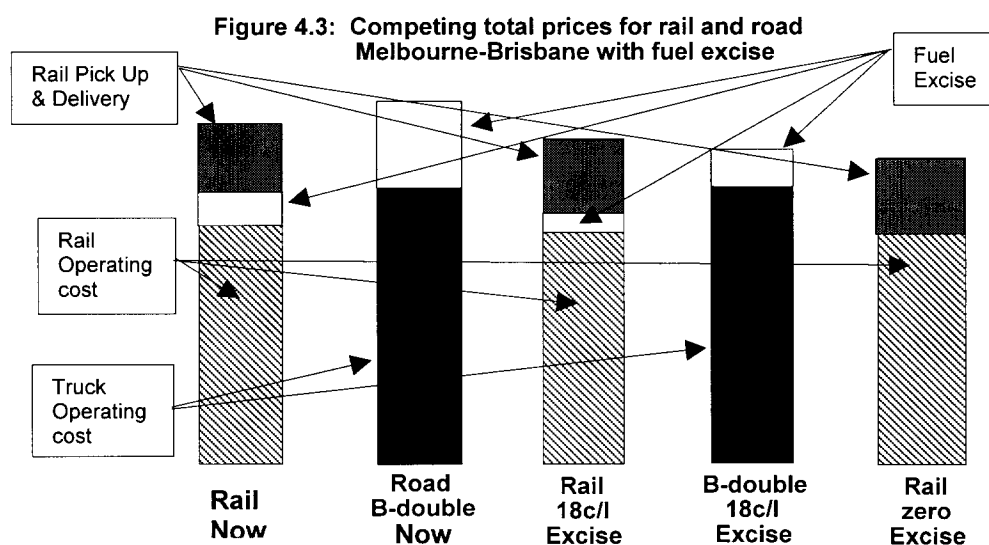
Proposals to reduce diesel fuel excise to a common level for rail and trucking operators will aggravate already skewed competition between trains and trucks

Conversion of the present diesel excise into a tax common to rail and trucking would aggravate the imbalance between charging for road and rail infrastructure. The present skewing against rail of competitive neutrality in infrastructure access charging would be aggravated by retention of 18 cents/litre diesel excise as a tax levied on both rail and trucking operations, when all other off-road users would be exempt. A major component in the current two-part charge for road use would be set aside, seriously distorting competitive neutrality in transport.

According to government estimates, the full tax package would deliver a total reduction in costs for rail of 3.8%. For competing road transport the reduction would be 6.7%, and for sea freight 5.7%. The greater gain to road transport from this package would result from:

- The substantially greater fuel consumption of road transport (approximately double that for rail),
- The larger proportionate reduction in excise to be paid on fuel used by heavy trucks (Fuel excise for heavy trucks will drop from 43¢/litre to 18¢, a reduction of 58% or 25¢/litre; for rail users, fuel excise will drop from 35¢/litre to 18¢, a reduction of 49% or 17¢/litre).

The 9 percentage-point differential in favour of road transport users compared with rail users would have a significant competitive impact. Figure 4.3 demonstrates this by showing the effect on the relative cost of rail and road transport before and after the proposed change in the excise. With present levels of excise, rail has a substantial cost advantage; this is reversed with fuel excise at 18c/l for both road and rail; even if rail is exempted, the advantage is eroded substantially. These relative changes result from the much higher fuel consumption of trucks for any given quantity of freight.



A very large amount of freight now on rail transport in all interstate corridors and intrastate would transfer to heavy road transport if rail is required to continue paying a fuel excise which is clearly a de facto road use charge. The proposed increase in heavy vehicle mass limits will aggravate this modal transfer.

For the farm sector, the National Farmers' Federation has estimated that retention of 18¢/litre excise on rail will increase the cost of grain transport by approximately 80 cents per tonne, a significant figure nationally.

Lack of accountability for service quality by infrastructure authorities has hampered National Rail's progress in relation to both cost and customer service quality

The quality of track access can be affected by two factors – the quality of track and related infrastructure, and train control decisions which can divert trains from contracted train 'paths'.

National Rail has in place or is negotiating commercial track access agreements with five rail infrastructure owners. In case has the owner been willing to include in one of these agreements provisions imposing penalties on either party for sub-standard performance. National Rail has attempted in all cases to introduce quality standards and accompanying 'key performance' indicators into these agreements, but without success.

The multiplicity of regimes for commercial track access on the interstate track network is a substantial extra cost to existing rail operators and new entrants

There are several issues:

- There is a different access regime in each state, none of which are yet declared 'effective' by the National Competition Council
- There are currently six organisations which control interstate track and associated facilities (sidings and loops) on the interstate network – Queensland Rail, NSW RAC, VicTrack, ARTC, Australian Southern Railroad, and Westrail. Each has a different set of terms and conditions and pricing structure.
- There is no definition of a 'national track network' which is universally accepted or has statutory backing (this is in contrast to the National Highway Network). The Neville Committee recommended that a formal definition be agreed.

The priorities for change in this area are:

- Develop and implement a formal definition of the national track network
- Harmonise access regimes applying to the national track network; this could be done most effectively by formal declaration of an access regime for this track, through application to the National Competition Council.

The complexity of regulation of interstate rail equipment, operational procedures and employee competencies is a significant barrier to entry and a significant impost on innovation for existing operators

The complexity of regulation of rail is in stark contrast to the simplicity of regulation of the competing road transport industry.

This issue has been well exposed by the 'Maunsell Report (*Australian Transport Council 1997b*), and processes have begun to develop plans for addressing these issues through ATC.

Reviews of rail safety legislation and of on-the-ground regulation of rail safety in NSW are addressing issues of duplication of regulation by rail safety bodies and track owners. Outcomes from these investigations should be made available to the Commission.

A major handicap in improving the financial results of the business has been the constraint on National Rail's ability to carry intra-state freight

The *Memorandum of Association* of National Rail (in *NRC 1991*, Schedule 1) requires that National Rail obtain the permission of each State to carry *intra-state* freight within that state. Two steps are required – first a reference of constitutional power to the Commonwealth (to own shares in an entity carrying intrastate freight), and second, written authority from a Minister. Meanwhile, National Rail's rail-based competitors need no such permission, either for interstate or intrastate freight.

The status of progress in obtaining authority to carry intra-state freight in each state is as follows:

- In New South Wales and Victoria, the required reference of constitutional power was effected in the legislation ratifying the establishment of National Rail in 1991. Ministerial authority has subsequently been given, although in NSW only during FY1997/98.
- In Western Australia there is a Bill in Parliament which will enact the required reference of power; the bill also contains provisions relating to a proposed regime for rail infrastructure access.
- In South Australia a Bill to effect the reference of power has been introduced into the State Parliament, and is expected to be enacted by the end of 1998. The Minister has indicated in her second reading speech that she will give case-by-case permission for carriage of intra-state freight.
- No request has been made to the Queensland Government to give permission to carry intrastate freight in that state, owing to the break of track gauge.

All governments have indicated informally that in their view the authority they have given to National Rail to carry intra-state may be revoked by them at any time.

The inability to legally carry intrastate freight has resulted in many instances where National Rail has been unable to enter, or complete, negotiations with present or potential new customers for carriage of freight. In a number of cases, the business foregone has been substantial.

It should be noted that this constraints on National Rail's ability to compete in all markets practically available to it will not disappear when the Commonwealth ceases to have part ownership of the company. Clause 4 of the *Memorandum of Association* requires that the provisions of clause 3 may be amended or repealed only by unanimous agreement of all the parties to the Shareholders' Agreement, that is all mainland states. As most have an interest in protecting the business of their state-owned or state-based railway, gaining this unanimous agreement is unlikely to be simple.

Where state-based rail authorities receive CSO's (community service obligations) from their respective the disadvantage to National Rail can be aggravated, even after permission to carry intrastate freight has been obtained.

It is important that this situation be changed permanently and without delay. It is clearly in conflict with the Competition Principles adopted by all governments.

The proposal for a National Land Transport Commission

There is strong competition between road and rail, but the terms of competition are very uneven in respect of pricing for infrastructure access and the availability of finance for infrastructure investment. Sub-optimal outcomes from competition are very likely when pricing and investment decisions are not taken in a consistent way across modes. This is in fact how it is now being done.

Substantial resources have been devoted to investigation and determination of appropriate *road use charges* by the NRTC, and road investment programs for the national highway system are developed on a state and national basis. Funding is continuously available through well established Commonwealth-State financial arrangements.

No such arrangements are in place for the rail sector. The ARTC does not have the geographic scope, the required analytical resources (it is not an economic research body), or the financial resources to replicate the arrangements in place for competing road transport.

This submission has argued that both infrastructure investment and pricing require thorough investigation. Clearly such an investigation must take into account intermodal competitive issues.

The Australian Transport Council will shortly consider a proposal for a *National Land Transport Commission* aimed at integrating assessment of issues affecting both road and rail. The Neville Committee's report supported formation of a Land Transport Commission.

Obvious issues for the agenda of a National Land Transport Commission are:

- Development of an action plan for harmonisation of rail safety regulation and operating practices, including required investment.
- A framework for economically efficient rail infrastructure pricing by commercial infrastructure providers, taking into account the framework and levels of road use pricing for competing trucks
- Definition of a *national rail highway* and development of a plan for catch-up and new investment.

It has been envisaged that a proposed *NLTC* would be formed by expanding the scope of the National Road Transport Commission. We have reviewed the arguments in favour of this option, and alternatives, and have concluded that 'immediate' establishment of a Land Transport Commission is the best option. In reality the process of establishment would require 12 months, and at least a further 12 months would be needed to develop a detailed work program in the areas listed above.

Other issues are not developed in detail in this submission. Submissions on these issues have been made to previous inquiries (eg NRC 1997), and will come from other parties for this submission. National Rail can make further submissions at the request of the Productivity Commission.

APPENDIX A: National Rail in the 1991 Report on Rail

Quotes from Industry Commission 1991 Review	Page	Comment
The [formation] of [National Rail] will result in a single , commercially operating [sic] company responsible for interstate freight in Australia.	314	National Rail now operates a seamless interstate rail freight business linking all mainland states and the Northern Territory. Responsibility for the interstate rail freight business was taken up gradually from April 1993 to December 1997, as functions were transferred from state-based rail authorities.
The NRC is ... expected to break even within three years and become totally self supporting after five years....	315	The loss from the interstate rail freight business has been reduced so far from \$321 million in 1990/91 to \$20.4 million (before tax) in 1997/98. See Figures 3.1 and 3.2 for details.
Preconditions for success identified by the National Freight Initiative Committee include ... adequate start-up financial resources ...	316	Shareholders committed 3 main forms of start-up support: \$406.5 m cash equity (100% paid up); transfer of functions and assets nominated by National Rail; and compensation for excess costs of transferred functions (called 'wedge payments' as they tapered to zero by the end of the Establishment Period – 31 January 1998).
The National Rail Corporation will assemble an asset base comprising terminals, track, signalling systems and rollingstock sufficient to ensure it is commercial viable.	316	Nominations in successive Corporate Plans have been approved by Shareholders. Assets transferred to date are all wagons, most locomotives (approx 15 of 64 nominated are awaiting release of financial encumbrances), and some terminal land and equipment. The latter have been transferred from the Commonwealth. Negotiations are occurring on terms for long-term lease or access to of nominated land in Victoria. NSW transfers will occur in parallel with Victoria.
The NRC should help increase efficiency through ... large productivity improvements ... with revised work practices and anticipated average productivity gains of at least 35 per cent ...	316	The cost per net tonne km (NTK) has reduced from 5.4 cents per NTK in 1990/9 to 2.9 cents per NTK in FY 1997/98. This is an overall productivity improvement of 42% (details in Table 3.1).
Preconditions for success identified by the National Freight Initiative Committee include cost reductions (achieved through work force reductions ...)	316	Before transfer of the business to National Rail, more than 9,000 were employed in interstate rail freight. This total is now approx 1,700, including employees of outsource suppliers and track access (460 of the total).
The commission recommends the removal of all restrictions on the contracting of tasks so that railway can take every opportunity to attain maximum efficiency.	xx	National Rail's three enterprise agreements (1993, 1995 and 1997) provide for outsourcing of 'non-core' functions.

Quotes from Industry Commission 1991 Review	Page	Comment
Preconditions for success ... include increased private sector involvement in the provision of rollingstock, locomotives, terminals and infrastructure	316	National Rail outsources locomotive maintenance, wagon building and some modifications and overhauls, information technology, treasury management, internal audit, insurance, and other corporate functions. Track access is also provided from outside the company. Approx 70% of total cost structure is paid to external suppliers.
The commission recommends that all rail authorities strive for more efficient use of ... labour ... more employment of permanent part-time staff, ...casual and temporary employment, ... multi-skilling....	xxi	National Rail's enterprise agreements (1993, 1995 & 1997) provide for a range of productivity changes (multi-skilling, simplified classifications, simplified pay structures, outsourcing of non-core functions, competency-based promotion and selection, flexible employment & job sharing, driver-only operation).
... seniority based promotion and introduction of merit based promotion [should be abolished] ... [there should be] salary structures that allow scope for recruitment or promotion of employees ... depending on an individual's skills, qualifications and experience.	xxi	All appointments and promotions in National Rail are by selection based on proven "competence, qualifications and experience" (Enterprise Agreement 3, 1997, cl 9 [NRC 1997b])
with respect to their management of labour resources, railways [should] not be subject to government policy constraints	xxi	There are no government policy constraints or directives issued to National Rail.
The provision of reliable and timely interstate freight services by a national body, such as the intended National Rail Corporation, will increase rail's share of the interstate freight transport market.	xviii	National Rail's freight services averaged 93% on-time performance in FY 1997/98. (Table 3.2 for details).
Increased reliability through changed attitudes, changed operating procedures, and more reliable equipment.	316	According to benchmarked employee attitude surveys, National Rail employee commitment to customer service is high.
...Commonwealth and State legislation [should] be changed so that the coverage of the Trade Practices Act extends to railway authorities	318	National Rail is subject to the <i>Trade Practices Act 1975</i> , including Part IIIA.
... owners of railway tracks ... [should] be required to allow access by other organisations (whether public or private) to operate on their tracks, subject only to capacity being available and negotiation of a commercial agreement which sets prices and conditions for access....	xxii- xxiii 334	National Rail and other users purchases track access on commercial terms, subject to Part IIIA of the <i>Trade Practices Act 1995</i> . Different state-based track Access Regimes are being established or have been established in every State. See Figure 4.

Quotes from Industry Commission 1991 Review	Page	Comment
<p>... the NRC [should] lead to more efficient interstate ... operations – and intrastate freight operations which will benefit from flow on effects.</p>	317	<p>National Rail is not permitted to carry intrastate freight except with approval from State Governments (see <i>NRC 1991a, Memorandum of Association</i>, clause 3 & 4), in spite of right of private sector rail operators to compete against National Rail for interstate freight.</p>
<p>The Commonwealth should require open access on [NRC] lines [but] Open access to the network will be unlikely to attract many private services</p>	334	<p>Three competitors have established services on the east-west corridor, resources largely with equipment and labour force hired from state-based rail authorities and the private rail companies which have purchased the assets of Australian National. There is no evidence that this competition has brought more volume onto rail, confirming the Commission's implied judgment about available business.</p>
<p>The Commission has given careful consideration to ... of establishing a rail infrastructure authority, [but] ... benefits of sufficient magnitude are not yet evident. The case against separation of rail infrastructure from train operations ... at the present time depends on traffic densities....</p>	334	<p>The Commonwealth has formed the Australian Rail Track Corporation Ltd to take commercial control of interstate tracks, but except in SA, implementation has not been completed. Commercial access to the rail network is hampered by (1) the lack of a national access regime applying to the whole 'national rail highway' (all States are developing separate access regimes), (2) lack of definition of the national track system, (3) fragmented control of track by many private and public sector owners, (4) complex regulations regarding safety accreditation of equipment, operations and employee competencies, and (5) lack of harmonisation of operating rules and traffic control (safeworking) rules, systems, infrastructure and communications.</p>

APPENDIX B: Notes on Requirement for Harmonisation of Safeworking Systems

The need for harmonisation of regulations, equipment standards and operating rules and practices extends across many facets of railway operations. Two areas highlighted by the Maunsell Report (*Australian Transport Council 1998*) are systems for train safeworking and radio communications.

This Appendix contains information about these two aspects of the requirement for harmonisation.

Safeworking and signalling systems

Figure B.1 illustrates the complexity of operating rules applying to trains on the national track system. In total there are 24 different safeworking systems (sets of rules for train separation) applying across 53 designated route segments totalling 9,790 km. Figure B.1 shows:

- The top portion of the chart lists horizontally the 53 route sectors across the national track network (HRMS Route Codes, eg RQ01), with the safeworking codes in use on each route section (eg SWN1). Generally two to four safeworking codes are in use in each sector.
- The lower left portion of the chart tabulates the 24 safeworking codes and the respective systems they represent by National Rail locomotive depots. Eg drivers in Junee depot work on route sectors where there are 10 systems in use.
- The lower right portion of the chart shows the differing safeworking re-certification requirements in force in each state; these are requirements for drivers' qualifications (in safeworking systems) and route knowledge (in each applicable route sector) to be re-examined and recertified at regular intervals.

This chart speaks for itself, but the reality is worse than portrayed. In some *route sectors* there are several changes of signalling system within the area of each safeworking system; only the different safeworking systems are shown on the chart.

Signals instruct drivers to stop, proceed, or use caution; the safeworking system provides the means by which trains are detected and signal indications activated, and the detailed rules for train operation.

For example, on route sector RN19 (Chullora-Junee) there are three safeworking systems in operation: SWN1 (shunting), SWN3 (electric staff), and SWN7 (track block and automatic). Within the area of SWN3, there are four changes of signalling systems. First, drivers must respond to double colour light signals for several kilometres, then single colour light signals, then back to double, then to upper quadrant semaphore signals (wig-wags), and then lower quadrant semaphore signals, and finally for the remainder of the sector, single aspect colour signals. Each of these has a different system for indicating stop, go and caution.

In some sectors, where there are no signals, the method of ensuring train separation involves time-consuming manipulation of electric staff instruments or staff and ticket tokens.

Drivers' route knowledge qualifications involve not only detailed knowledge of the safeworking systems and signalling systems, and where they occur, but also knowledge of permanent speed limits, gradients which affect train working, levels crossings, problem areas en route (eg restricted sight distances to signals), and not least radio frequencies for train control and company communications.

Radio communications

Trains communicate with train control centres, company train management, with each other, with track gangs and with terminal operators, via radio. Radio frequencies change frequently across the national track network, requiring complex radio equipment, and constant attention from drivers to ensure correct radio channels are selected for each task and area.

The very large number of frequencies in use also places large demands on rail operators and track owners for provision of radio equipment and on controllers for attention to detail in its use.

The complexity of the system is reflected in the following quotation (*Deveney 1998a*):

The communication facilities and current call types have evolved due to the differing safeworking practices of the rail authorities and their investment strategies. Each system has evolved to best meet the requirements of their operation and necessarily are influenced by the equipment capabilities which in turn

depend on the level of investment. The differences between systems is a major inhibition to flexible locomotive operation on the interstate corridors. Newer systems able to provide the capabilities currently in use on the private call systems without the need for owned infrastructure are emerging. They offer the prospect with their wide functionality that a “one mobile equipment fits all” situation might be realised.

.... The standardisation of communications is an important efficiency issue for the rail industry and is worthy of far more attention at a national level involving owners and operators alike.

In order to provide reliable and simple communications for use by drivers, National Rail has developed the AWARE (Australia Wide Augmented Radio Environment) radio system, which is currently being installed on NR Class locomotives (*Deveney 1998b*)

The AWARE system automatically selects radio channels depending on location, and requires the driver only to click and speak. This very complex system has been costly to develop, and at this point in time does not fully cover the system (it has not yet been accredited for operation in Victoria).

Costs

The costs imposed on rail operators and track owners by this multiplicity of safeworking, signalling and communications equipment are difficult to quantify, but include:

- Reduced capacity of track, which is a key issue in some corridors
- Increased transit times (eg, change from the staff and ticket system to radio based train orders between Parkes and Broken Hill would save 45-60 minutes transit time)
- Complex qualification and re-qualification of drivers and other safety personnel
- Increased maintenance costs of outdated equipment; modern signalling systems involve in-cab signalling, with minimal line-side installations.
- The high cost of developing and installing the AWARE system in 120 NR class locomotives.

REFERENCES

- Australasian Railway Association (1998a). *Economic Impact on Rail of Diesel Fuel Excise*. Report by David Hill, ARA Research Officer. Melbourne July 1998.
- Australasian Railway Association (1998b). *Impact on Rail of Proposed Tax Reform Package*. Melbourne August 1998.
- Australian Automobile Association (1993). *Land Transport Infrastructure. Maximising the Contribution to Economic Growth*. Report by The Allen Consulting Group Pty Ltd. Melbourne November 1993.
- Australian Automobile Association (nd [1998]). *Tax Reform and Fuel Tax*.
- Australian National Railways Commission (1987). *Review of Road Vehicle Mass Regulations, Overloading and Enforcement on Australian Arterial Roads*. Report by Travers Morgan Pty Ltd, Adelaide August 1987 (Confidential).
- Australian Rail Track Corporation (1997). *Agreement between the Commonwealth of Australia and the States of New South Wales, Victoria, Queensland, Western Australia, and South Australia*, 14 November 1997.
- Australian Railway Research and Development Organisation (ARRDO)(1981). *1981 Report on Rail*. Melbourne December 1981.
- Australian Transport Advisory Council (1976). *Some Economic and Financial Implications of Recommended New Vehicle Limits*, Report by Fred Affleck and Associates to Co-ordinating and General Committee of the Australian Transport Advisory Council. Adelaide May 1976.
- Australian Transport Council (1993). *A National Approach to Rail Safety Regulation*. Report to the Standing Committee on Transport, Intergovernmental Working Group on Rail Safety. September 1993.
- Australian Transport Council (nd [1996]). *Taxes and Charges paid by the Road Transport Industry*. Canberra.
- Australian Transport Council (1997a). *Communique 14 November 1997*.
- Australian Transport Council (1997b). *National Rail Summit Communique, 10 September 1997*.
- Australian Transport Council (1998a). *Communique 24 April 1998*.
- Australian Transport Council (1998b). *Study of Rail Standards and Operational Requirements*. Final Report. Prepared by Maunsell Pty Ltd. February 1998.
- Bureau of Industry Economics (1992a). *International Performance Indicators – Rail Freight*. Research Report 41. Canberra, April 1992.
- Bureau of Industry Economics (1992b). *International Performance Indicators: Road Freight*. Research Report 46. Canberra, April 1992.
- Bureau of Industry Economics (1993). *International Performance Indicators – Rail Freight Update 1993*. Research Report 52. Canberra, 1992.
- Bureau of Industry Economics (1994). *International Performance Indicators, Overview*, Research Report 53. Canberra, February 1994.
- Bureau of Industry Economics (1995a). *Issues in Infrastructure Pricing*. Research Report 69. Canberra August 1995).
- Bureau of Industry Economics (1995b). *Rail Freight 1995. International Benchmarking*, Report 95/22. Canberra December 1995.
- Bureau of Transport and Communications Economics (1992). *Social Cost of Transport Accidents in Australia*. Report 79. Canberra September 1992.
- Bureau of Transport and Communications Economics (1995a). *Adequacy of transport infrastructure – Multimodal*. Working Paper 14.6. Canberra January 1995.
- Bureau of Transport and Communications Economics (1995b). *Adequacy of transport infrastructure – Rail*. Working Paper 14.2. Canberra January 1995.
- Bureau of Transport and Communications Economics (1995c). *Analysis of the Rail Deficit*. Information Paper 40. Canberra October 1995.

Bureau of Transport and Communications Economics (1995d). *Greenhouse Gas Emissions from Australian Transport. Long-Term Projections*. Report 88. Canberra March 1995.

Bureau of Transport and Communications Economics (1996a). *Econometric Evidence on the Benefits of Infrastructure Investment: An Australian Transport Perspective*. Working Paper 25. Canberra May 1996.

Bureau of Transport and Communications Economics (1996b). *Economic Effects of a Brisbane-Melbourne inland railway*. Working Paper 18. Canberra March 1996.

Bureau of Transport and Communications Economics (1996c). *Quality of Rail Freight Service. The Customer's Perspective*. Report 96. Canberra December 1996.

Bureau of Transport and Communications Economics (1996d). *Transport and Greenhouse. Costs and options for reducing emissions*. Report 94. Canberra July 1996.

Bureau of Transport and Communications Economics (1997). *Taxes and Charges in Australian Transport: A Transmodal Overview*. Working Paper 34. Canberra October 1997.

Business Council of Australia (1992). *Fast-Tracking Transport Reforms. Introducing Competitive Pressures throughout Australia's Land Transport Industries*. Report for the Business Council of Australia Transport Task Force by Access Economics. Melbourne September 1992.

Committee on Darwin (1995). *Alice Springs to Darwin Rail Link Study: Final Report*. Report by Travers Morgan Pty Ltd, Macquarie Corporate Finance Ltd and BHP Engineering. Sydney May 1995.

Commonwealth Competitive Neutrality Complaints Office (1997). *Draft Guidelines*. Canberra July 1997.

Commonwealth of Australia (COA)(1992a). *National Rail Corporation Agreement Act 1992*. No 26 of 1992.

Commonwealth of Australia (COA) (1992b). *One Nation*. Statement by the Prime Minister The Honourable P.J. Keating, MP. Canberra 26 February 1992.

Commonwealth of Australia (COA) (1998). *Tax Reform. Not a new tax a new tax system. The Howard Government's Plan for a New Tax System*. Circulated by The Honourable Peter Costello, MP, Treasurer of the Commonwealth of Australia, August 1998.

Commonwealth Treasury of Australia (1996). *Commonwealth Competitive Neutrality Statement*. Canberra June 1996.

Council of Australian Governments (1990). *Heads of Government Agreement on the National Rail Freight Corporation*, 31 October 1990.

Deveney, Tom (1998a). *AWARE Communications Call Modes*, paper delivered to Institute of Radio and Signal Engineers, Adelaide, March 1998.

Deveney, Tom (1998b). *Overview of the AWARE Communications System. National Rail Corporation*. paper delivered to Institute of Radio and Signal Engineers, Adelaide, March 1998.

Economic Planning and Advisory Council/Commission (EPAC) (1995). *EPAC Private Infrastructure Task Force Final Report*.

Ernst and Young (1998). *Benchmarking Review of Operating Costs. Final Report*. Report for National Rail, September 1998.

Hensher, D., Daniels, R., DeMellow, I. (1992). *Productivity of Australian Railways, 1971-72 to 1990-91*, Research Report 175-RR-92-1, Institute of Transport Studies, Graduate School of Business, University of Sydney.

Industry Commission (1991). *Rail Transport*. 2 volumes. Canberra August 1991.

Industry Commission (1994). *Petroleum Products*, Report No 40, 1994.

Intergovernmental Agreement on Railway Safety (1993), an Agreement between the Commonwealth of Australia and the States of New South Wales, Victoria, Queensland, Western Australia and South Australia [date?].

National Competition Council (1996). *The National Access Regime. A Draft Guide to Part IIIA of the Trade Practices Act*. Canberra August 1996.

National Competition Council (1997). *Competitive neutrality reform: issues in implementing clause 3 of the Competition Principles Agreement*. Canberra January 1997.

National Competition Policy Review (1993). *National Competition Policy*. Report by the Independent Committee of Inquiry. Canberra August 1993.

National Rail Corporation Ltd (NRC) (1991). *Agreement about the establishment of National Rail Corporation Limited*, between the Commonwealth of Australia and the States of New South Wales, Victoria, Queensland and Western Australia. 30 July 1991. This document is the Schedule to the National Rail Corporation Agreement Act 1992, No 26 of 1992 (Cwlth).

National Rail Corporation Ltd (NRC) (1991). *Interstate Rail Freight Business Summary*. Report by Travers Morgan Pty Ltd, Sydney November 1991.

National Rail Corporation Ltd (NRC) (1993). *Agreements to amend the agreement about the establishment of National Rail Corporation Limited*, between the Commonwealth of Australia and the States of New South Wales, Victoria, Queensland, Western Australia and South Australia. 30 November 1993.

National Rail Corporation Ltd (NRC) (1994). *First Full Year Results. 1993/94 a year of challenge and achievement*. Sydney November 1994.

National Rail Corporation Ltd (NRC) (1995a). *Human Resources Strategic Plan, 1995-1999*. Sydney June 1, 1995.

National Rail Corporation Ltd (NRC) (1995b). *NRC Corridor Infrastructure Evaluation*, report by Symonds Travers Morgan Pty Ltd. Sydney July 1995 (Confidential).

National Rail Corporation Ltd (NRC) (1995c). *The Service Revolution. Half Time Scorecard on the "Railway Revolution"*. Sydney November 1995.

National Rail Corporation Ltd (NRC) (1996). *National Rail Corporation Strategic Review*. Report by Fay, Richwhite. Sydney December 1996 (confidential).

National Rail Corporation Ltd (NRC) (1996). *One Nation Rail Infrastructure June 92-June 95. Completion Report*. Adelaide October 1996.

National Rail Corporation Ltd (NRC) (1997a). *Annual Report for the 1996/1997 Financial Year*. Parramatta December 1997.

National Rail Corporation Ltd (NRC) (1997b). *Enterprise Agreement 3 – 1997*. Parramatta July 1997.

National Rail Corporation Ltd (NRC) (1997c). *Impact of Competitive Neutrality on the Rail Industry*. Final Report. Report by PPK Environmental and Infrastructure Pty Ltd. Sydney July 1997.

National Rail Corporation Ltd (NRC) (1997d). *Submission to the Inquiry into the Role of Rail in the National Transport Network*. Parramatta, October 1997. In PCA (nd [1997]) (The Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Communications, Transport and Microeconomic Reform). *Submissions – Inquiry into the Role of Rail in the National Transport Network. Submission No 26, Vol 2, pp 235-287*. Canberra October 1997.

National Rail Corporation Ltd (NRC) (1998) *Annual Report for the 1997/98 Financial Year* [to be released November 1998]

National Rail Freight Initiative Task Force (1991). *Review of the Financial Results of the Intersystem Rail Freight Operations for 1989/90*. Report by Ernst and Young. Sydney May 1991.

National Road Transport Commission (1992). *Heavy Vehicle Charges Determination*. Melbourne June 1992.

National Road Transport Commission (1993). *Investigation of Fuel-only Charges for Heavy Vehicles*. Investigation Report Prepared for Ministerial Council, May 1993.

National Road Transport Commission (1996). *Mass Limits Review – a study of the feasibility and net benefits of increasing mass limits for vehicles fitted with road friendly suspension systems*. Report and Recommendations of the Steering Committee. Melbourne July 1996.

National Road Transport Commission (1998). *Updating Heavy Vehicle Charges: Draft Policy 'Paper for Comment*. Melbourne August 1996.

National Transport Planning Taskforce (1994). *Building for the Job: A Strategy for Australia's Transport Network*. Canberra November 1994.

National Transport Planning Taskforce (1995a). *Building for the Job: Commissioned Work Volume 1: BTCE Report*. Canberra January 1995.

National Transport Planning Taskforce (1995b). *Building for the Job: Commissioned Work Volume 2: Economic Studies*. Canberra January 1995.

National Transport Planning Taskforce (1995c). *Building for the Job: Commissioned Work Volume 3: Other Studies*. Canberra January 1995.

New South Wales, Minister for Transport (1995), *NSW Rail Access Regime, Established by the Minister for Transport, with approval of the Premier, in accordance with section 19B of the Transport Administration Act 1988*, Sydney [date].

PNSW (1989) (The Parliament of New South Wales). *State Owned Corporations Act 1989*.

Northern Territory Department of lands, Planning and Environment (1996). *Northern Territory Trans-continental Railway Corridor Proposed Land Use Objectives*. Darwin June 1996.

PCA (1989) (The Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport, Communications and Infrastructure), *Rail: Five Systems – One Solution. The Efficiency of Australian National's East-West Operations*. Canberra, November 1989.

PCA (1994) (The Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Communications, Transport and Microeconomic Reform), *Efficiency Audit Review: The National Highway 'Lifeline of the Nation'*. Canberra November 1994.

PCA (1997a) (The Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Communications, Transport and Microeconomic Reform), *Planning not Patching. An inquiry into Federal road funding*. Canberra, October 1997.

PCA (1997b) (The Parliament of the Commonwealth of Australia, Senate Rural and Regional Affairs and Transport References Committee. *Report on the Brew Report and on the continuing Role of the Commonwealth in the Australian Rail Industry*. Canberra May 1997.

PCA (1998) (The Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Communications, Transport and Microeconomic Reform), *Tracking Australia, An Inquiry into the role of rail in the national transport network*. Canberra July 1998.

Productivity Commission (1996). *Stocktake of progress in microeconomic reform*. Canberra June 1996.

Productivity Commission (1997a). *Industry Commission Submission to the National Competition Council on the National Access Regime. A Draft Guide to Part IIIA of the Trade Practices Act*. Canberra, January 1997.

Productivity Commission (1997b). *Industry Commission Submission to the National Competition Council on Specialized Container Transport's Declaration Application*. Canberra, May 1997.

Sharp, Hon John , MP (1997). *National Agreement on Interstate Rail Reform*. Media Statement, 10 September 1997.

South Australia (1997), *Railways (Operations and Access) Act 1997*. No 55 of 1997.

Standards Australia (1996). *Australian Standard 4292 (parts 1-5). Rail Safety*. Sydney various dates.

Standards Australia (1998). *Draft Australian Standard. Railway Accident Investigation*. Sydney May 1998.

Starrs, Margaret (1997). *National Competition Policy and Competitive Neutrality*. Paper presented to 'Road versus Rail' conference, Melbourne September 1997).

Steering Committee on National Performance Monitoring of Government Trading Enterprises (1993). *Government Trading Enterprises Performance Indicators 1987-88 to 1991-91*. Melbourne July 1993.

Steering Committee on National Performance Monitoring of Government Trading Enterprises (1997). *Government Trading Enterprises Performance Indicators 1991-92 to 1995-96. Volume 1: Report, and Volume 2: Data*. Melbourne May 1997.

Telford, C (1989). *Meeting the Competition in Major Road and Rail Developments*. Australian Investment conference, Business Opportunities in Transport Reform, September 1989.