



# WATERLINE

DECEMBER 1996 ISSUE NO. 9

BUREAU OF TRANSPORT AND  
COMMUNICATIONS ECONOMICS

## FROM THE DIRECTOR

This issue of *Waterline* includes our regular article on stevedoring performance. The feature articles cover waterfront reliability, crew to berth ratios in Australian shipping and port charging.

I would like to take this opportunity to wish our readers a safe and happy Christmas. The next issue of *Waterline* will be published in March 1997.

Stephen Hunter  
Director


## IN BRIEF

### Stevedoring performance


Overall productivity at Australia's major container terminals improved in the September quarter 1996.

The five port average crane rate was 22.3 teus per hour in the September quarter, up from 21.5 teus per hour in the June quarter. The net rate increased to 29.1 teus per hour (from 28.5 teus per hour) and the elapsed rate rose to 23.6 teus per hour (from 22.6 teus per hour).


Crane rates increased at Brisbane (20.4 teus per hour), Sydney (20.6 teus per hour), Melbourne (24.5 teus per hour) and Adelaide (22.7 teus per hour). Net rates and elapsed rates generally rose at these ports. At Fremantle, there were declines in the crane rate (20.8 teus per hour), the net rate and the elapsed rate.

As quarterly variations in the proportion of traffic comprising 40 foot containers may affect teu-based indicators, *Waterline* also includes indicators expressed in containers per hour. In the September quarter, crane rates increased at Melbourne (19.6 containers per hour) and Adelaide (19.3 containers per hour), and declined at Brisbane (16.5 containers per hour) and Fremantle (17.8 containers per hour). There was no change at Sydney (16.3 containers per hour). 


### Waterfront reliability

The BTCE, in consultation with major industry participants, has identified a set of indicators of waterfront reliability for container traffic. The indicators cover ship arrival, berth availability, pilotage, towage, linesmen, cargo availability and stevedoring. It is envisaged that the first data will be published in the March 1997 issue of *Waterline*. 


### Crew to berth ratios

The shipping industry reform process in Australia has included targets for reductions in the crew to berth ratios for merchant and offshore shipping. Data collected by the BTCE indicate that these reform targets have not been achieved over the period of the monitoring process. Crew to berth ratios have increased for both merchant shipping (since the September quarter 1993) and offshore shipping (since the March quarter 1995). 

### Port charging structures and terminologies

There is significant variation in the structures of port and related charges at Australia's six largest container ports. The terminologies for some charges also differ between ports. These variations reflect responses to local factors and differences in port authority/ corporation objectives and pricing strategies. 

### Index of articles

This issue contains an index of the articles which have appeared in *Waterline* since the first issue was published in July 1994. 

## STEVEDORING PERFORMANCE

Figures 1 to 6 provide information on stevedoring performance at Australia's major container terminals over the period to the end of the September quarter 1996. Time series data on container terminal performance from the *Waterline* database are contained in [table 6](#).

The stevedoring performance data for Brisbane, Sydney, Melbourne and Fremantle are averages for the terminals operated by P&O Ports and Patrick at each port. The Adelaide data cover the SeaLand terminal.

The information on stevedoring productivity in [figures 1 to 6](#) and [table 6](#) is expressed in teus per hour.

[Table 1](#) presents the data for the last four quarters in terms of containers per hour. The June quarter figures for several ports (and therefore the five port averages) have been revised following the receipt of amended data from one of the terminal operators. These changes are identified in [tables 1 and 6](#).

### Five port average

Overall productivity (in teus per hour) at Australia's major container terminals increased in the September quarter 1996. There were improvements in productivity at Brisbane, Sydney, Melbourne and Adelaide.

The five port average *crane rate* (productivity per crane while the ship is worked) was 22.3 teus per hour in the September quarter, up from 21.5 teus per hour (revised) in the June quarter ([figure 1](#)).

The five port average *net rate* (total productivity while the ship is worked) rose to 29.1 teus per hour in the September quarter from 28.5 teus per hour (revised) in the June quarter. Average crane intensity (the average number of cranes used to work the ship) was 1.32, compared with 1.34 (revised) in the previous quarter.

The five port average *elapsed rate* (productivity based on the time the ship is available to be worked) was 23.6 teus per hour in the September quarter, up from 22.6 teus per hour (revised) in the June quarter. On a per crane basis the figure rose to 17.9 teus per hour, from 16.9 teus per hour (revised) in the previous quarter.

The five port average figure for the proportion of elapsed time not worked was 19.0 per cent in the September quarter. This was below the June quarter figure of 20.4 per cent (revised).

### Brisbane

Stevedoring performance at Brisbane improved in the September quarter ([figure 2](#)).

The crane rate was 20.4 teus per hour, up from 19.9 teus per hour in the previous quarter.

The net rate rose to 25.1 teus per hour in the September quarter from 24.3 teus per hour in the June quarter. Average crane intensity was 1.24 compared with 1.22 in the previous quarter.

Brisbane's elapsed rate was 21.3 teus per hour in the September quarter, up from 20.5 teus per hour in the June quarter. On a per crane basis the figure increased to 17.2 teus per hour, from 16.8 teus per hour in the previous quarter.

The average proportion of elapsed time not worked at Brisbane was 15.1 per cent in the September quarter, compared with 15.8 per cent in the June quarter.

### Sydney

Sydney's stevedoring performance improved in the September quarter ([figure 3](#)).

The crane rate was 20.6 teus per hour, up from 20.3 teus per hour in the previous quarter.

The net rate at Sydney increased to 29.5 teus per hour in the September quarter from 27.7 teus per hour in the June quarter. Average crane intensity was 1.46 compared with 1.41 in the previous quarter.

Sydney's elapsed rate was 23.1 teus per hour in the September quarter, up from 21.8 teus per hour (revised) in the June quarter. On a per crane basis the figure increased to 15.8 teus per hour, from 15.5 teus per hour (revised) in the previous quarter.

The average proportion of elapsed time not worked at Sydney was 21.6 per cent in the September quarter, similar to the June quarter figure of 21.3 per cent (revised).

### Melbourne

At Melbourne, there was an improvement in stevedoring performance in the September quarter ([figure 4](#)).

The crane rate was 24.5 teus per hour, up from 22.3 teus per hour (revised) in the previous quarter.

The net rate was 31.9 teus per hour in the September quarter, the same as the revised figure for the June quarter. Average crane intensity was 1.31 compared with 1.43 (revised) in the previous quarter.

Melbourne's elapsed rate was 26.3 teus per hour in the September quarter, up from 25.0 teus per hour (revised) in the June quarter. On a per crane basis, there was an increase to 20.1 teus per hour from 17.5 teus per hour (revised) in the previous quarter.

The average proportion of elapsed time not worked at Melbourne was 17.6 per cent in the September quarter, down from 21.5 per cent (revised) in the June quarter.

## Adelaide

Adelaide's stevedoring performance improved in the September quarter (figure 5).

The crane rate increased to 22.7 teus per hour, from 21.5 teus per hour in the previous quarter.

The net rate rose marginally to 26.8 teus per hour in the September quarter from 26.7 teus per hour in the June quarter. A decline in average crane intensity to 1.18, from 1.24 in the previous quarter, partly offset the impact of the higher crane rate.

Adelaide's elapsed rate was 26.2 teus per hour in the September quarter, up marginally from 26.1 teus per hour in the June quarter. On a per crane basis, the figure was 22.2 teus per hour compared with 21.0 teus per hour in the previous quarter.

Adelaide continued to have a very low proportion of time not worked. The average proportion of elapsed time not worked was 2.2 per cent in the September quarter, the same as the June quarter figure.

## Fremantle

Stevedoring performance at Fremantle declined in the September quarter (figure 6).

Fremantle's crane rate was 20.8 teus per hour, down from 23.4 teus per hour (revised) in the previous quarter.

The net rate fell to 22.9 teus per hour in the September quarter from 23.5 teus per hour (revised) in the June quarter. Average crane intensity was 1.10 compared with 1.00 (revised) in the previous quarter.

Fremantle's elapsed rate was 16.0 teus per hour in the September quarter, down from 17.4 teus per hour (revised) in the June quarter. On a per crane basis the figure fell to 14.6 teus per hour, from 17.4 teus per hour (revised) in the previous quarter.

The average proportion of elapsed time not worked at Fremantle was 30.0 per cent in the September quarter, up from 25.8 per cent (revised) in the June quarter.

## Containers per hour

*Waterline* has traditionally reported stevedoring indicators on the basis of teus per hour as this format provides continuity with the earlier data published by WIRA. For the purposes of these indicators, a 40 foot container is classified as two teus.

Quarterly (and longer-term) variations in the proportion of traffic comprising 40 foot containers may affect teu-based indicators of stevedoring performance. *Waterline* therefore includes stevedoring indicators expressed in containers per hour.

Table 1 presents these indicators for the last four quarters. It covers the same ship calls as the teu data in table 6. In the September quarter, the proportion of traffic comprising 40 foot containers increased at three ports (Brisbane, Sydney and Melbourne) and declined at two ports (Adelaide and Fremantle).

The five port average crane rate increased to 18.0 containers per hour in the September quarter from 17.7 containers per hour (revised) in the June quarter. There were also increases in the net rate and the elapsed rate.

Crane rates increased at Melbourne (19.6 containers per hour) and Adelaide (19.3 containers per hour) in the September quarter. The crane rate at Sydney (16.3 containers per hour) was unchanged. There were declines in crane rates at Brisbane (16.5 containers per hour) and Fremantle (17.8 containers per hour).

## **WATERFRONT RELIABILITY**

The BTCE is currently developing indicators of waterfront reliability for regular inclusion in *Waterline*. These indicators will complement the existing measures of performance which cover stevedoring productivity, port interface costs and port performance (financial and non-financial).

The concept of reliability typically focuses on the *variability and predictability* of performance. In contrast, the available indicators of waterfront performance in Australia generally measure average performance over a period of time (for example, the average crane rate).

The indicators of waterfront reliability for publication in *Waterline* are being developed in consultation with major industry participants. A set of proposed indicators has been identified ([table 2](#)).

### **Workshop on reliability**

Development of the reliability indicators commenced in July 1996 with a half-day BTCE workshop. The objectives of the workshop were to identify indicators of waterfront reliability and to examine other issues such as the causes of poor reliability. A BTCE paper, circulated to participants prior to the workshop, provided an overview of major issues in the preparation of reliability indicators.

The workshop was attended by 26 representatives of shippers, shipping lines, port authorities, pilots, stevedores, towage operators, customs brokers and government agencies. Industry participants expressed strong support for the development of indicators of waterfront reliability for container shipping. They noted that such indicators would fill a significant gap in the existing measures of waterfront performance.

It was agreed that the indicators should initially cover container traffic at the five mainland capital city ports, and that they might be expanded at a later stage to cover specific aspects of break-bulk cargo. Industry representatives considered that the work on reliability would ideally cover all parts of the ship/port/land transport chain. However, it was agreed that the indicators should initially focus on ship operations (including services such as pilotage and towage) and container terminals.

There was some discussion at the workshop of the appropriate measurement approach. Industry participants strongly supported an approach based on the proportion of observations meeting a given standard (eg the proportion of ship movements where tugs are available to assist the ship within 1 hour of the confirmed ship arrival time). They considered that indicators prepared on this basis would be simpler and easier to understand than more technical measures such as the standard deviation.

### **Proposed indicators**

In August, the BTCE distributed a summary of the workshop proceedings to all participants. A proposed set of reliability indicators, developed on the basis of the workshop discussions, was also circulated to several representatives of shipping lines, stevedores, port authorities and pilots. Their comments were subsequently incorporated in the proposed indicators which are outlined in [table 2](#).

The notice periods for scheduled and confirmed ship movement times in [table 2](#) are based on general operating practices in the shipping industry. The format of the available data, and therefore the indicators for particular ports, may be affected by variations in booking practices at individual ports. For example, in one port the pilots take bookings up to two hours before the time of the ship movement, whereas in another port the final cut-off time is 3.30 pm on the previous working day.

The industry representatives who commented on the draft indicators also provided information on acceptable levels of reliability. These levels were expressed in terms of the minimum proportion of observations that should fall within the specified range for each indicator (eg the percentage within the  $\pm 1$  hour range). A proportion of 90 per cent was proposed for six of the indicators, reflecting a recognition that some delays are inevitable given Australia's relatively small traffic volumes and the high infrastructure costs that would be incurred to eliminate delays completely. A proportion of 100 per cent was suggested for ship arrival (confirmed time), availability of cargo, stevedoring completion (confirmed time) and stevedoring rate.

### **Further work**

The BTCE is currently obtaining data for the reliability indicators from port authorities and other providers of waterfront services. The data collection process may result in some further refinement of the indicators. It is expected that the first data will be published in the March 1997 issue of *Waterline*.

The data collected by the BTCE should provide a basis for identifying major sources of waterfront unreliability. It is envisaged that, resources permitting, the BTCE will undertake further work on waterfront reliability once the initial statistical series is established.

## **CREW TO BERTH RATIOS**

The shipping reform process in Australia has included several initiatives to reduce crew costs on merchant and offshore vessels. These initiatives have involved crew sizes, employment practices, and crew to berth ratios.

In broad terms, the crew to berth ratio measures the average number of seafarers required for each position on a ship (or group of ships) over a specified period. More than one seafarer is required for each position as, at a particular time, some crew members will be ashore for purposes such as recreation leave, compensation leave and training.

This article provides an overview of crew to berth ratios in Australian merchant and offshore shipping, based on work undertaken by the BTCE. The data will be regularly updated in future issues of *Waterline*.

### **Monitoring process**

Prior to BTCE monitoring, it was widely believed that the crew to berth ratio for Australian merchant shipping was around 2.2. In 1993 the Government and the Shipping Reform Negotiating Committee agreed on an objective of a 10 per cent reduction in the overall crew to berth ratio (ie to around 2.0). The Shipping Industry Reform Authority (SIRA) subsequently asked the BTCE to undertake a quarterly review of the crew to berth ratio in order to monitor progress towards this objective.

Under the 1994 Maritime Industry Restructuring Agreement (MIRA), Australian shipowners and maritime unions agreed that the monitoring process for merchant shipping should continue. It was also agreed that similar but separate work should be undertaken for ships servicing the offshore oil and gas industry. In addition, the MIRA process reaffirmed the objective for the merchant shipping fleet (an overall crew to berth ratio of 2.0) and established an objective for the offshore shipping fleet (a slightly higher ratio due to additional leave included in the industry's awards).

Most of the companies operating Australian-flag merchant ships and about half of the offshore shipping companies agreed to provide data for the monitoring process. The first crew to berth ratios for merchant shipping were calculated for the September quarter 1993. Monitoring of offshore shipping began in the first quarter of 1995. The BTCE currently receives data from eight companies operating merchant ships and four companies operating offshore ships.

### **Methodology**

The methodology to calculate crew to berth ratios was developed by the Australian National Maritime Association and endorsed by the BTCE.

For the purposes of the monitoring process, the crew to berth ratio is defined as the number of seafarer days paid over a period of time, divided by the number of berth days the ship/s (or fleet) operated. Berth days operated is defined as the sum of the number of people required each day during the period to carry out the work assigned to each ship.

The average crew to berth ratio for a shipping operation is effectively the sum of six components:

- ship time—the ratio of days paid for ship duty (which may include travelling time and days signing on and off) to berth days;
- recreation leave—with the ratio for individual operations determined by the industrial awards for merchant and offshore shipping and by company practice;
- compensation leave—reflecting the level of accidents, injuries and sick leave;
- long service leave—with the ratio for individual operations determined by the industrial awards covering merchant and offshore shipping;
- study leave—reflecting days of paid leave for officers for educational purposes; and
- training and other paid leave—including days paid to seafarers taken off their normal duties for work in the office or in port operations.

Ratios for the individual components are calculated by dividing the number of paid person days in each category by the number of berth days for that category.

The crew to berth ratios for the merchant and offshore shipping fleets are weighted averages of the ratios for individual companies. For each fleet, there is some variation in individual company ratios as a result of differences in shipping operations and company practices.

## Merchant shipping

Figure 7 presents data on the crew to berth ratio, and its components, for Australian merchant shipping over the period from the September quarter 1993 to the September quarter 1996.

At the start of the monitoring process, the crew to berth ratio for Australian merchant shipping was 2.133. Figure 7 indicates that, over the three years to the end of the September quarter 1996, the ratio dropped below its initial level only once (in the December quarter 1994). The September quarter 1996 figure (2.195) was 2.9 per cent above the initial figure and 9.8 per cent higher than the objective of 2.0 agreed in the MIRA process.

Figure 7 indicates that ship time is the largest component of the crew to berth ratio for merchant shipping. The average ratio for this component is greater than 1.0 because some companies pay seafarers a full day's pay for days signing on or off and for days travelling to or from the ship. In the September quarter 1996 the ship time ratio was 1.041 (initial level 1.025).

Recreation leave is the second largest component of the crew to berth ratio. For the merchant fleet, the minimum recreation leave ratio specified in the award is 0.926 days leave for each day worked. In the September quarter 1996, the recreation leave ratio averaged 0.981 (initial level 0.971). There is some variation in the ratios for individual companies as a result of factors such as above award leave provisions, accumulation of leave for travel days and days signing on or off, and variation in crewing levels in relation to berth days.

Figure 7 shows that seafarers' compensation leave is the third largest component of the crew to berth ratio for merchant shipping. The MIRA agreement envisaged that reductions in compensation claims would contribute significantly to reductions in the crew to berth ratio. However, compensation leave has been above the initial level in the first three quarters of 1996. The September quarter 1996 compensation ratio (0.090) was 23.3 per cent above the initial figure (0.073).

Long service leave for seafarers accumulates at the rate of 13 weeks for 15 years on the register which equates to 0.8667 weeks (about 6.1 days) per year. Figure 7 indicates that the long service leave ratio for merchant shipping has been virtually constant over the three years, with a figure of 0.036 in the September quarter 1996.

The study leave and the training and other components together accounted for only 2 per cent of the total crew to berth ratio in the September quarter 1996. The study leave ratio (0.023) was slightly below its initial level (0.024), while the training and other ratio (0.024) was considerably above its initial level (0.006).

Table 3 shows the individual components of the crew to berth ratio for merchant shipping, by crew classification, in the September quarter 1996. Catering crew had the highest crew to berth ratio (2.216) followed by integrated ratings (2.198), engineers (2.186) and deck officers (2.181).

## Offshore shipping

Figure 8 presents data on the crew to berth ratio, and its components, for Australian offshore shipping over the period from the March quarter 1995 to the September quarter 1996.

The overall crew to berth ratio for offshore shipping at the start of the monitoring process was 2.327. Figure 8 shows that the ratio has remained above that level in every subsequent quarter. In the September quarter 1996 the crew to berth ratio was 2.338, 0.5 per cent above the initial level.

Figure 8 indicates that recreation leave is the largest component of the crew to berth ratio for offshore shipping. A minimum factor of 1.153 recreation days for each day worked is specified in the industrial award for the offshore shipping industry. In the September quarter 1996, the recreation leave ratio averaged 1.157 (initial level 1.151).

The average ratio for ship time was 1.025 in the September quarter 1996 (initial level 1.021). The ship time ratio for the offshore fleet will generally be closer to 1.0 than the ratio for the merchant fleet since the work

## WATERLINE December 1996, Issue no. 9

of the offshore fleet does not involve long sea voyages requiring crew changes in distant ports. Travel time to or from the ship and arrangements for signing on or off do not usually involve an extra day's pay in the offshore industry.

**Figure 8** shows that compensation leave is the third largest component of the crew to berth ratio for the offshore fleet. The September quarter 1996 figure was 0.104, 4.0 per cent higher than the figure at the beginning of the monitoring process (0.100). The compensation ratio has dropped below its initial level in only one subsequent quarter.

Long service leave in the offshore shipping industry accumulates at the same rate as in the merchant shipping industry (about 6.1 days per year). **Figure 8** indicates that the ratio for offshore shipping has been constant since the March quarter 1995.

The study leave and the training and other components fluctuate considerably from quarter to quarter in the offshore shipping industry. However, these components have generally accounted for less than 1.0 per cent of the overall crew to berth ratio for offshore shipping.

**Table 4** shows the individual components of the crew to berth ratio for offshore shipping, by crew classification, in the September quarter 1996. Integrated ratings had the highest crew to berth ratio (2.387) followed by catering crew (2.336), engineers (2.307) and deck officers (2.286).

### Concluding comments

The crew to berth ratio provides a measure of the average number of seafarers required for each position on a ship (or group of ships) over a specified period. The shipping industry reform process in Australia has included targets for reductions in the crew to berth ratios for merchant and offshore shipping.

These reform targets have not been achieved over the period of the BTCE's monitoring process. Crew to berth ratios have increased for both merchant shipping (since the September quarter 1993) and offshore shipping (since the March quarter 1995).

## **PORT CHARGING-STRUCTURES AND TERMINOLOGIES**

The BTCE's Port Interface Cost Index provides a measure of shore-based shipping costs for containers. It focuses on charges at Australia's five mainland capital city ports. The development of the index is described in BTCE Report 84 (BTCE 1993).

The Port Interface Cost Index incorporates a range of charges on ships and cargo. The terminologies used for stevedoring charges, customs brokers' fees and road transport charges are consistent across ports. However, there is some inter-port variation in the terminologies for several components of port and related charges.

This article provides an overview of port and related charges at Australia's six largest container ports—the five mainland capital city ports and Burnie. A feature article on port interface costs at Burnie will be included in the next issue of *Waterline*.

### **Structures of port and related charges**

The port and related charges in the Port Interface Cost Index comprise six categories of ship-based charges and three categories of cargo-based charges. [Table 5](#) outlines these charges at the six major container ports. It indicates that there is significant inter-port variation in the structures of port and related charges.

All of the ports have pilotage, towage and wharfage charges. There are separate charges for mooring/unmooring at all ports except Adelaide where charges for these services are included in the tonnage charge.

The other categories of port and related charges apply at specific ports. There are conservancy charges at three ports and tonnage charges at five ports. Berth hire, harbour dues and berth charges are each applied at only one port.

[Table 5](#) also indicates that there is some inter-port variation in the terminology within charging categories. Charging terminology is discussed below in terms of conservancy, tonnage, wharfage, and other port and related charges.

### **Conservancy**

Conservancy charges cover calls by a particular ship at one or more ports in a State over a specified period. This category was previously called State government charges but has been renamed to reflect changes at Adelaide where the charge is now collected by the port authority/corporation.

The conservancy charges at individual ports (November 1996) are as follows:

- Brisbane—Conservancy Dues of \$0.183 per gross registered tonne, valid for one month, paid to a State government department;
- Adelaide—Navigation Service Charge per visit of \$830 plus \$0.0915 per gross registered tonne, with a 25 per cent reduction for each additional visit within a six month period, paid to the port authority/corporation; and
- Fremantle—Conservancy Dues of \$0.0919 per gross registered tonne, valid for 2 months, paid to a State government department.

### **Tonnage**

Tonnage charges, which are paid to port authorities/corporations, are applied at all ports except Brisbane. There is significant inter-port variation in the terminology for these charges. The charges per port entry at individual ports for container ships (November 1996) are as follows:

- Sydney—Navigation Services Charge of \$0.41 per gross registered tonne;
- Melbourne—Channel Use Charge of \$0.40 per gross registered tonne;
- Adelaide—Harbor Service Charge of \$2 600 plus \$0.00435 per gross registered tonne per hour at berth;



- Fremantle—Tonnage Rates of \$0.147 per gross registered tonne (for ships without an inboard incinerator) or \$0.140 per gross registered tonne (for ships with an inboard incinerator); and
- Burnie—Tonnage Rates of \$0.07 per gross registered tonne for the first day (maximum of \$775), \$0.02 per gross registered tonne per day for the next 9 days (maximum of \$220 per day) with a maximum of \$1 535 for any period up to and including the tenth day, and \$0.0194 per gross registered tonne per day after the tenth day.

## Wharfage

Wharfage, which is a cargo-based charge payable by cargo owners, is collected by port authorities/corporations at all of the ports. The charges included in this category of the Port Interface Cost Index are called wharfage at all ports except Adelaide where the term is Cargo Service Charge.

The ports generally have separate wharfage rates for 20 foot and 40 foot containers and for loaded and empty containers. Charges at individual ports also distinguish between:

- overseas imports, and exports and local imports (Sydney);
- transhipped and other cargo (Melbourne);
- primary produce and other commodities (Adelaide);
- landbridged and other cargo (Adelaide and Fremantle);
- import and export containers (Burnie); and
- dry and reefer containers (Burnie).

## Other port and related charges

The terminology for pilotage, towage and mooring/ un-mooring charges is consistent across ports. The berth hire, harbour dues and berth charge categories each apply at only one port.

Pilotage services are provided by private operators at four ports (Brisbane, Sydney, Melbourne and Fremantle) and by port authorities/corporations at two ports (Adelaide and Burnie). The charges are generally based on the gross registered tonnage of the ship, although in Fremantle there is a flat rate for each service.

Towage services are provided by private operators at each of the six ports. The charge per tug for each ship movement at a port is based on the gross registered tonnage of the ship.

Mooring and unmooring services for container ships are provided on a sole operator basis by port authorities/ corporations at three ports (Adelaide, Fremantle and Burnie) and by private operators at two ports (Brisbane and Sydney). At Melbourne, these services are now provided by Melbourne Port Services (a subsidiary of the port authority/corporation) and Melbourne Mooring Services (a private operator). Charges for mooring and unmooring are based on the number of staff and the time taken to handle the ship (Brisbane), the gross registered tonnage of the ship (Sydney), ship length (Melbourne), a flat rate per service (Fremantle) or an hourly labour rate (Burnie). As noted earlier, there is no separate charge for basic mooring and unmooring services at Adelaide.

Ship-based berth hire at Melbourne is charged by the terminal operators. The charges are based on hourly rates while the ship is at the berth.

Harbour dues at Brisbane are paid to the port authority/ corporation. The container cargo rate varies for 20 foot and 40 foot containers, for full and empty containers, and for refrigerated and other cargoes.

The berth charge (cargo berth hire) at Fremantle is paid to the port authority/corporation. There are flat rates for 20 foot and 40 foot containers.

# WATERLINE

## December 1996, Issue no. 9

### Comparing charges

Any inter-port comparisons of port and related charges should not be based on individual components alone. The comparisons should include all of the major ship-based and cargo-based charges in a form such as the Port Interface Cost Index.

The variation between ports in charging structures and terminologies reflects responses to local factors and differences in port authority/corporation objectives and pricing strategies. The pricing objectives which may be pursued by port authorities/corporations include the facilitation of trade, minimising charges for port users and achieving a specified return on investment. For example, the absence of a tonnage charge at Brisbane reflects the port authority/ corporation strategy of encouraging ship calls at the port.

### Concluding comments

There is significant variation in the structures of port and related charges at Australia's six largest container ports. The terminologies for conservancy, tonnage and wharfage charges also vary between ports. The variation in charging structures and terminologies between ports reflects responses to local factors and differences in port authority/corporation objectives and pricing strategies.

# TABLES

**TABLE 1** CONTAINER TERMINAL PERFORMANCE INDICATORS, DECEMBER QUARTER 1995–SEPTEMBER QUARTER 1996

(containers per hour)

Port/indicator	Quarter			
	Dec 1995	Mar 1996	Jun 1996	Sep 1996
<b>Brisbane</b>				
Crane rate	15.8	17.6	16.7	16.5
Elapsed rate	17.0	18.8	17.2	17.5
Net rate	20.6	21.5	20.4	20.4
<b>Sydney</b>				
Crane rate	15.0	15.8	16.3	16.3
Elapsed rate	17.6	18.7	17.6 <sup>r</sup>	18.2
Net rate	21.0	21.9	22.4	23.3
<b>Melbourne</b>				
Crane rate	16.3	17.0	18.4 <sup>r</sup>	19.6
Elapsed rate	18.8	20.2	20.5 <sup>r</sup>	21.1
Net rate	21.9	23.4	26.1 <sup>r</sup>	25.6
<b>Adelaide</b>				
Crane rate	18.8	18.9	18.2	19.3
Elapsed rate	22.8	23.3	22.0	22.2
Net rate	23.3	23.8	22.5	22.8
<b>Fremantle</b>				
Crane rate	16.2	17.9	20.0 <sup>r</sup>	17.8
Elapsed rate	13.4	15.7	14.8 <sup>r</sup>	13.4
Net rate	16.7	18.9	20.0 <sup>r</sup>	19.6
<b>Five ports</b>				
Crane rate	15.9	16.9	17.7 <sup>r</sup>	18.0
Elapsed rate	17.7	19.3	18.6 <sup>r</sup>	19.0
Net rate	20.9	22.3	23.4 <sup>r</sup>	
23.5				

<sup>r</sup> Figure revised due to amended data from terminal operator.

Sources Patrick, P&O Ports and SeaLand.

**BTCE**

**GO BACK TO TEXT STEVEDORING PERFORMANCE or**  
**-Containers per hour**

**TABLE 2      PROPOSED INDICATORS OF WATERFRONT RELIABILITY**

<b>Aspect</b>	<b>Indicator</b>
Ship arrival at port	<p>Proportion of ship arrivals within <math>\pm 1</math> hour of the scheduled ship arrival time advised 24 hours before to the port authority.</p> <p>Proportion of ship arrivals within <math>\pm 15</math> minutes of the confirmed ship arrival time advised 6 hours before to service providers (pilots, towage operators, linesmen).</p>
Berth availability	Proportion of ship arrivals where the berth is available within 4 hours of the scheduled berthing time advised 24 hours before to the port authority.
Pilotage <sup>a</sup>	Proportion of ship movements where the pilot is available to board the ship at the agreed location within $\pm 1$ hour of the confirmed ship arrival/departure time advised 6 hours before by the ship's agent.
Towage <sup>a</sup>	Proportion of ship movements where tugs are available to assist the ship at the agreed location within $\pm 1$ hour of the confirmed ship arrival/departure time advised 6 hours before by the ship's agent.
Linesmen <sup>a</sup>	Proportion of ship movements where linesmen are available to handle the ship within $\pm 1$ hour of the confirmed ship arrival/departure time advised 6 hours before by the ship's agent.
Availability of cargo	Proportion of receivals completed by the end of the evening shift prior to the ship's arrival. for loading
Stevedoring	<p>Proportion of ship visits where stevedoring completion time is within <math>\pm 1</math> hour of the time initially agreed between the terminal operator and the client when the overall work program for the ship is prepared.</p> <p>Proportion of ship visits where stevedoring completion time is within <math>\pm 0</math> hours of the time confirmed by the container terminal operator 6 hours before expected completion.</p>
Stevedoring rate	Proportion of ship visits where the average crane rate for the ship is within $\pm 2$ containers per hour of the average crane rate for the terminal over the period.

a.      *Covers ship arrivals and ship departures.*



**GO BACK TO TEXT**

**WATERFRONT RELIABILITY or  
-Proposed indicators**

**TABLE 3 MERCHANT SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1996**

Crew type	Ship time	Recreation leave	Compensation	Long service leave	Study leave	Training & other	Total <sup>a</sup>
Deck officers	1.039	0.979	0.034	0.036	0.039	0.053	2.181
Engineers	1.039	0.977	0.026	0.036	0.063	0.046	2.186
<b>All officers</b>	1.039	0.978	0.030	0.036	0.051	0.050	2.184
Integrated ratings	1.047	0.986	0.127	0.036	0.000	0.002	2.198
Catering crew	1.036	0.975	0.167	0.036	0.000	0.002	2.216
<b>All ratings</b>	1.043	0.983	0.140	0.036	0.000	0.002	2.204
<b>All crew</b>	1.041	0.981	0.090	0.036	0.023	0.024	2.195

a. Components may not sum to totals due to rounding.

Source Data provided by ship operators

**BTCE**

## GO BACK TO TEXT CREW TO BERTH RATIOS - Merchant shipping

**TABLE 4 OFFSHORE SHIPPING CREW TO BERTH RATIOS BY ACTIVITY AND CREW CLASSIFICATION, SEPTEMBER QUARTER 1996**

Crew type	Ship time	Recreation leave	Compensation	Long service leave	Study leave	Training & other	Total <sup>a</sup>
Deck officers	1.023	1.156	0.060	0.037	0.009	0.000	2.286
Engineers	1.018	1.157	0.045	0.038	0.050	0.000	2.307
<b>All officers</b>	1.020	1.157	0.053	0.038	0.029	0.000	2.296
Integrated ratings	1.027	1.158	0.163	0.039	0.000	0.000	2.387
Catering crew	1.038	1.153	0.107	0.038	0.000	0.000	2.336
<b>All ratings</b>	1.029	1.157	0.155	0.039	0.000	0.000	2.380
<b>All crew</b>	1.025	1.157	0.104	0.038	0.014	0.000	2.338

a. Components may not sum to totals due to rounding.

Source Data provided by ship operators

**BTCE**

## GO BACK TO TEXT CREW TO BERTH RATIOS - Offshore shipping

**TABLE 5 PORT AND RELATED CHARGES INCLUDED IN THE PORT INTERFACE COST INDEX**

Charges	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Burnie
<b>Ship-based</b>						
Conservancy <sup>a</sup>	Conservancy Dues	-	-	Navigation Service Charge	Conservancy Dues	-
Tonnage	-	Navigation Services Charge	Channel Use Charge	Harbor Service Charge	Tonnage Rates	Tonnage Rates
Pilotage	Pilotage	Pilotage	Pilotage	Pilotage	Pilotage	Pilotage
Towage	Towage	Towage	Towage	Towage	Towage	Towage
Mooring & unmooring	Mooring & unmooring	Mooring & unmooring	Mooring & unmooring	d	Mooring & unmooring	Mooring & unmooring
Berth hire	-	-	Berth hire	-	-	-
<b>Cargo-based</b>						
Wharfage	Wharfage	Wharfage <sup>c</sup>	Wharfage	Cargo Service Charge	Wharfage	Wharfage
Harbour dues	Harbour Dues	-	-	-	-	-
Berth charge <sup>b</sup>	-	-	-	-	Cargo Berth Hire	-

- not applicable

a. Previously called State government.

b. Previously called berthing

c. Includes Port Cargo Access Charge

d. All mooring costs associated with a ship's initial arrival and final departure at Adelaide are included in the Harbor Service Charge.

Sources Price schedules of port authorities/corporations, towage operators and pilotage service providers.



**GO BACK TO TEXT**

**PORT CHARGING-STRUCTURES AND TERMINOLOGIES**

**-Structures and port related charges**

**TABLE 6 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, MARCH QUARTER 1992—SEPTEMBER QUARTER 1996**

Port	Mar-92	Jun-92	Sep-92	.....	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Mar-96	Jun-96	Sep-96	Past four quarters
<b>Brisbane</b>																		
Ships handled	85	96	93	na	106	111	112	140	140	187	136	123	135	132	124	133	140	529
Total teus	28235	39058	45055	na	49622	46529	37820	52983	51596	50574	41723	47065	58851	46439	35833	45172	50000	177444
Crane rate	17.0	18.0	19.8	na	21.2	21.1	20.4	20.8	20.3	18.9	18.4	18.0	18.6	18.9	20.0	19.9	20.4	19.8
Elapsed rate	19.6	21.2	25.6	na	26.6	24.6	20.9	22.6	21.5	19.6	17.8	18.6	19.5	21.0	21.3	20.5	21.3	21.0
Net rate	21.1	22.9	27.4	na	29.4	27.5	23.9	25.9	25.7	23.4	20.9	21.6	22.5	24.6	24.4	24.3	25.1	24.6
<b>Sydney</b>																		
Ships handled	105	109	112	na	205	238	177	240	223	221	218	202	192	203	206	216	228	853
Total teus	71702	68359	81287	na	124028	139321	116914	129586	142659	152326	144868	140113	148431	143746	127726	127995	135445	534912
Crane rate	18.6	19.8	20.9	na	19.8	20.4	16.4	18.5	16.9	16.0	18.9	18.1	19.3	18.5	19.8	20.3	20.6	19.8
Elapsed rate	19.9	22.9	24.1	na	22.6	22.0	18.7	20.8	19.4	20.3	21.6	20.7	23.4	21.8	23.5	21.8 <sup>r</sup>	23.1	22.6
Net rate	26.3	31.2	30.4	na	29.4	28.3	28.3	29.1	25.0	26.3	28.0	26.6	29.9	25.7	27.5	27.7	29.5	27.6
<b>Melbourne</b>																		
Ships handled	108	121	121	na	235	306	211	265	267	244	265	228	221	227	228	262	274	991
Total teus	73441	82757	86486	na	129687	143350	153420	158849	159039	180134	173338	152983	161943	173566	152440	157966	173267	657239
Crane rate	16.7	18.1	19.4	na	22.3	18.9	19.7	19.1	18.5	20.2	20.8	19.4	19.8	19.6	20.5	22.3 <sup>r</sup>	24.5	21.7
Elapsed rate	19.2	20.9	22.6	na	25.9	20.0	19.5	19.2	17.9	21.5	23.9	23.7	24.1	22.8	24.4	25.0 <sup>r</sup>	26.3	24.6
Net rate	22.1	23.9	24.9	na	29.3	22.9	23.8	22.7	21.3	25.8	26.9	25.9	26.6	26.4	28.3	31.9 <sup>r</sup>	31.9	29.6
<b>Adelaide</b>																		
Ships handled	22	20	21	na	21	26	28	34	31	33	35	50	34	42	47	63	70	222
Total teus	10810	10710	10763	na	9650	12616	13243	12461	13167	15038	16832	21676	14319	17318	15955	18803	20519	72595
Crane rate	19.8	18.7	19.1	na	19.8	20.9	20.6	19.1	19.8	20.2	21.5	20.2	20.9	21.4	21.5	21.5	22.7	21.8
Elapsed rate	27.2	24.4	25.9	na	23.1	25.5	27.8	24.7	24.6	24.2	24.9	24.9	24.9	26.1	26.6	26.1	26.2	26.3
Net rate	28.2	25.0	27.9	na	26.1	26.6	29.8	25.7	26.0	25.7	25.3	25.7	26.5	26.7	27.2	26.7	26.8	26.9
<b>Fremantle</b>																		
Ships handled	71	75	72	na	116	115	127	135	121	124	128	136	139	124	143	153	159	579
Total teus	25403	26572	27690	na	37566	40910	40587	40986	36635	46969	44388	45308	50050	44662	41916	45650	44537	176765
Crane rate	21.0	18.6	20.4	na	19.0	19.8	19.8	19.3	21.6	22.9	20.2	19.3	19.5	19.2	21.2	23.4 <sup>r</sup>	20.8	21.2
Elapsed rate	16.8	15.1	18.2	na	13.1	15.5	15.2	14.6	14.9	16.5	17.7	15.5	17.7	15.8	18.5	17.4 <sup>r</sup>	16.0	16.9
Net rate	21.0	18.6	21.4	na	19.4	21.0	19.8	19.5	21.8	23.4	21.6	20.5	21.1	19.8	22.2	23.5 <sup>r</sup>	22.9	22.1
<b>Five Ports</b>																		
Ships handled	391	421	419	na	683	796	745	814	782	809	782	739	721	728	748	827	871	3174
Total teus	209591	227456	251281	na	350553	382726	361984	394865	403096	445041	421149	407145	433594	425731	373870	395586	423768	1618955
Crane rate	18.0	18.7	20.1	na	20.9	19.9	18.8	19.2	18.5	18.9	19.9	18.9	19.5	19.2	20.3	21.5 <sup>r</sup>	22.3	20.8
Elapsed rate	19.4	20.7	23.1	na	23.4	21.0	19.2	19.9	18.9	20.4	21.9	21.2	22.5	21.7	23.2	22.6 <sup>r</sup>	23.6	22.8
Net rate	23.3	24.7	26.5	na	28.2	25.3	25.0	25.0	23.4	25.4	26.1	25.0	26.5	25.3	26.9	28.5 <sup>r</sup>	29.1	27.5

na not available

r Figure revised due to amended data from terminal operator.

Notes 1. To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993.

2. Indicators cover all quay crane operations on cellular ships calling at the container terminals.

3. For data back to the December quarter 1989, refer to Waterline 2.

Sources WIRA, Patrick, P&O Ports and SeaLand.



**INDEX OF WATERLINE ARTICLES—ISSUES 1 TO 9**

<b>Subject</b>	<b>Issue</b>	<b>Date</b>	<b>Pages</b>	<b>Coverage of article<sup>a</sup></b>
Coal ports in Australia	6	March 1996	10–13	Ports, terminals, capacity and operational changes, performance
Comparing port charges—methodology	4	October 1995	9–11	Teu exchanges and comparisons of port charges
Crew to berth ratios	9	December 1996	7–11	Recent trends for Australian merchant and offshore shipping
Distribution of benefits of waterfront reform	3	May 1995	11–14	Stevedoring, ship operators, importers, exporters
International comparisons of waterfront performance	4	October 1995	11–13	Overview of recent work
	5	December 1995	9–11	New Zealand ports
	6	March 1996	13–16	Asian ports
	7	June 1996	12–14	European ports
	8	September 1996	14	New Zealand (timber & steel coil)
Liner shipping	5	December 1995	11–13	Conference/non-conference shares in Australian trades to 1994/95
Non-containerised general cargo	8	September 1996	11–14	Cargoes, ships, ports, stevedoring, performance data
Port authority financial performance	1	July 1994	4–6	1992/93
	3	May 1995	5–6	1993/94
	6	March 1996	7–9	1994/95
Port charging—structures and terminologies	9	December 1996	11–13	Australia's six largest container ports
Port Interface Cost Index	1	July 1994	2–5	July–December 1993
	2	December 1994	2–5	January–June 1994
	3	May 1995	2–5	July–December 1994
	5	December 1995	2–5	January–June 1995
	7	June 1996	6–9	July–December 1995
	8	September 1996	6–9	January–June 1996
Port non-financial performance	1	July 1994	4–6	July–December 1993
	2	December 1994	5, 9	January–June 1994
	3	May 1995	6–7	July–December 1994
	6	March 1996	8–9	January–June 1995
	7	June 1996	10–11	July–December 1995
	8	September 1996	10–11	January–June 1996
Reliability	6	March 1996	6–7	Stevedoring industrial disputes
	7	June 1996	11–12	Concepts and available data
	9	December 1996	6–7	Proposed indicators
Stevedoring performance <sup>b</sup>	1	July 1994	5–11	December quarter 1993
	2	December 1994	6–11	March & June quarters 1994
	3	May 1995	7–11, 15	September & December quarters 1994
	4	October 1995	2–9, 15	March & June quarters 1995
	5	December 1995	5–9, 15	September quarter 1995
	6	March 1996	2–7, 19	December quarter 1995
	7	June 1996	2–6, 15	March quarter 1996
	8	September 1996	2–5, 15	June quarter 1996
	9	December 1996	2–5, 15	September quarter 1996

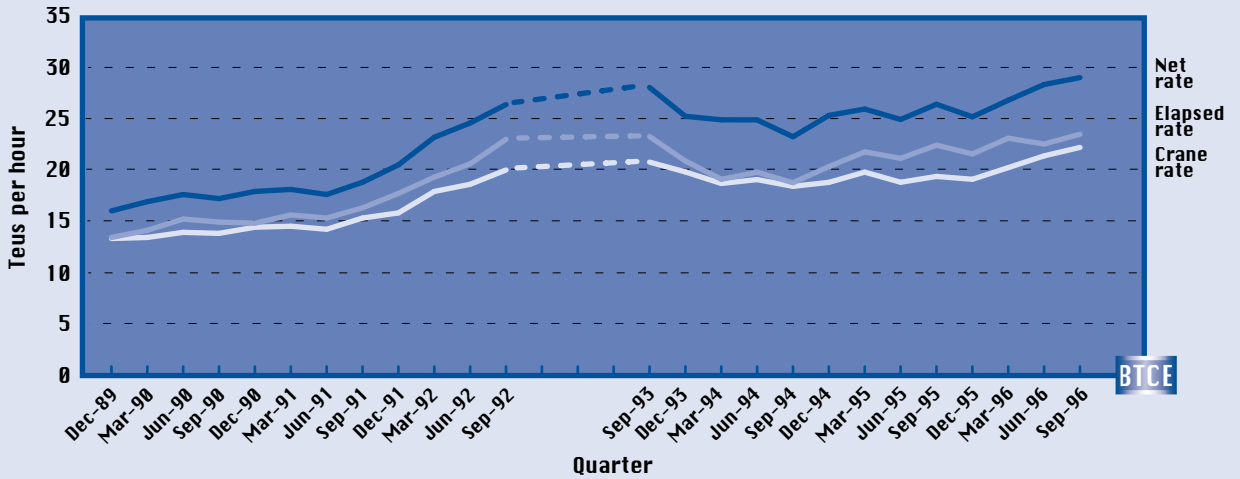
a. Period is latest quarter or half-year covered. Articles may also include earlier data.

b. For earliest available data on stevedoring performance (from December quarter 1989), see issue 1 (table 7) or issue 2 (table 6).



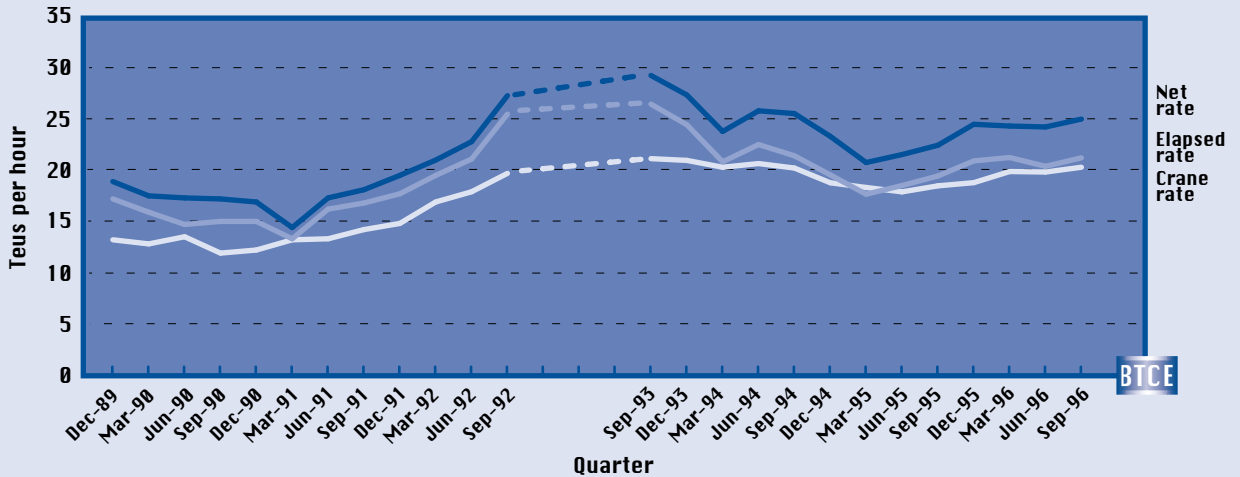
**FIGURES**

**FIGURE 1 FIVE MAJOR PORTS STEVEDORING PERFORMANCE INDICATORS**



**GO BACK TO TEXT STEVEDORING PERFORMANCE**  
-Five port average

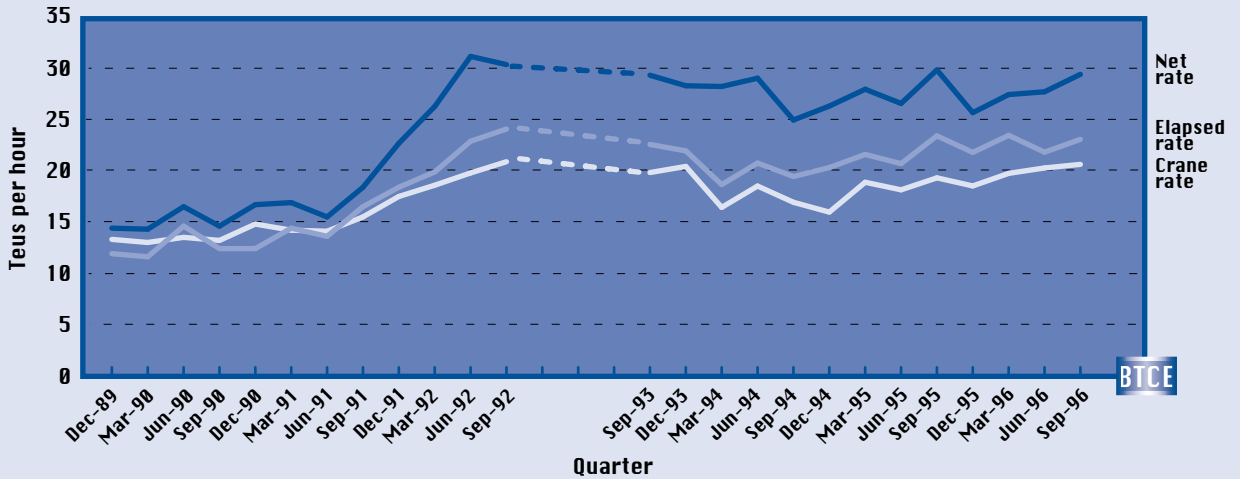
**FIGURE 2 BRISBANE CONTAINER TERMINALS PERFORMANCE INDICATORS**



**GO BACK TO TEXT STEVEDORING PERFORMANCE**  
-Brisbane

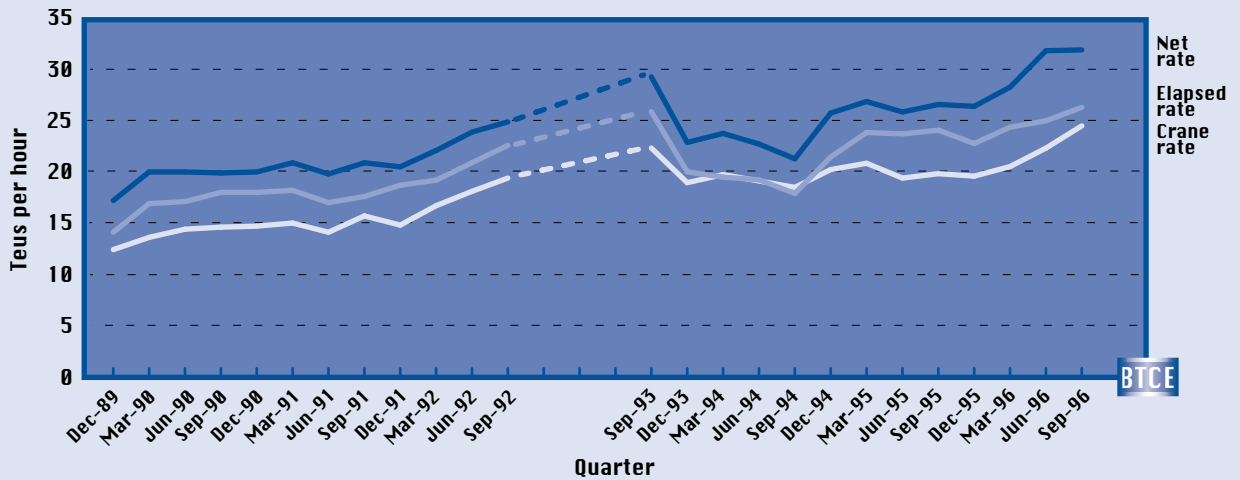
*Notes To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

**FIGURE 3 SYDNEY CONTAINER TERMINALS PERFORMANCE INDICATORS**



**GO BACK TO TEXT STEVEDORING PERFORMANCE -Sydney**

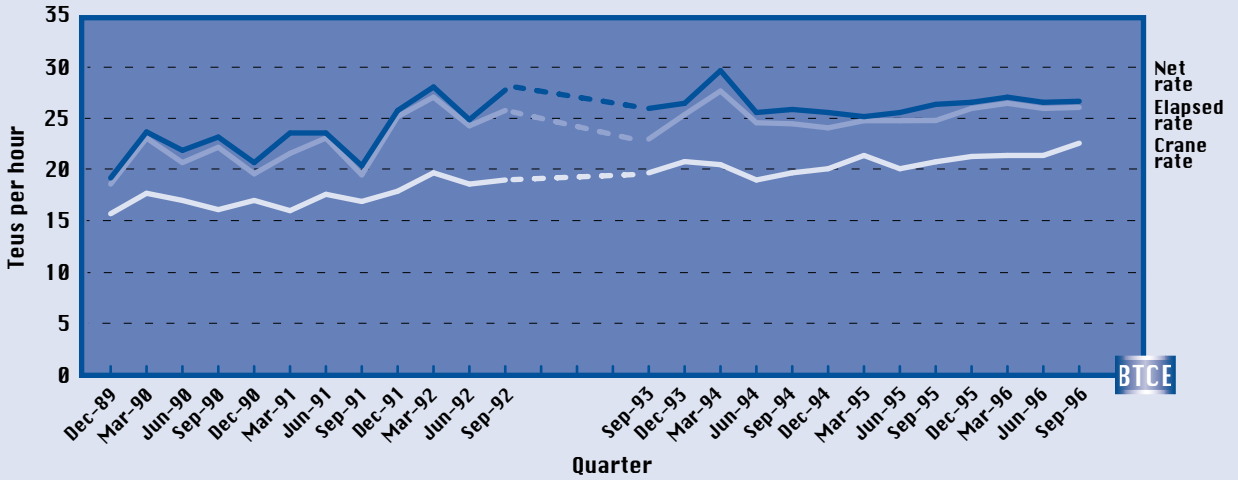
**FIGURE 4 MELBOURNE CONTAINER TERMINALS PERFORMANCE INDICATORS**



**GO BACK TO TEXT STEVEDORING PERFORMANCE -Melbourne**

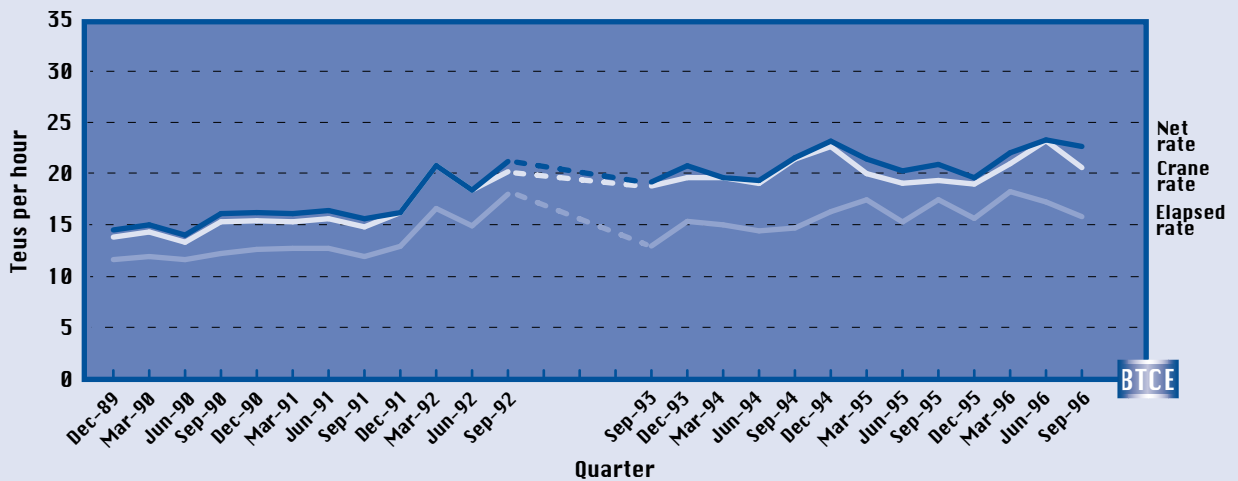
*Notes To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

**FIGURE 5 ADELAIDE CONTAINER TERMINAL PERFORMANCE INDICATORS**



**GO BACK TO TEXT STEVEDORING PERFORMANCE -Adelaide**

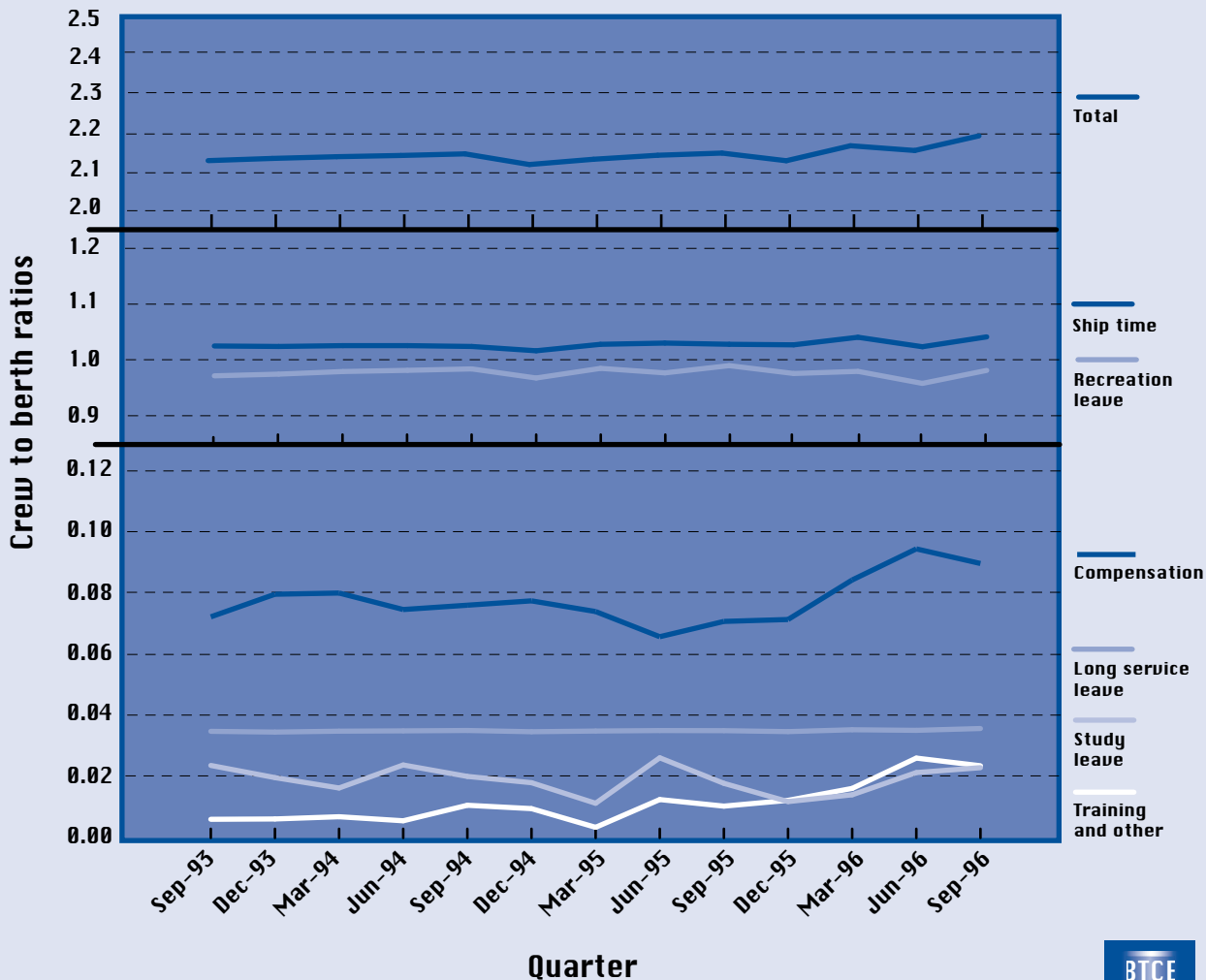
**FIGURE 6 FREMANTLE CONTAINER TERMINALS PERFORMANCE INDICATORS**



**GO BACK TO TEXT STEVEDORING PERFORMANCE -Fremantle**

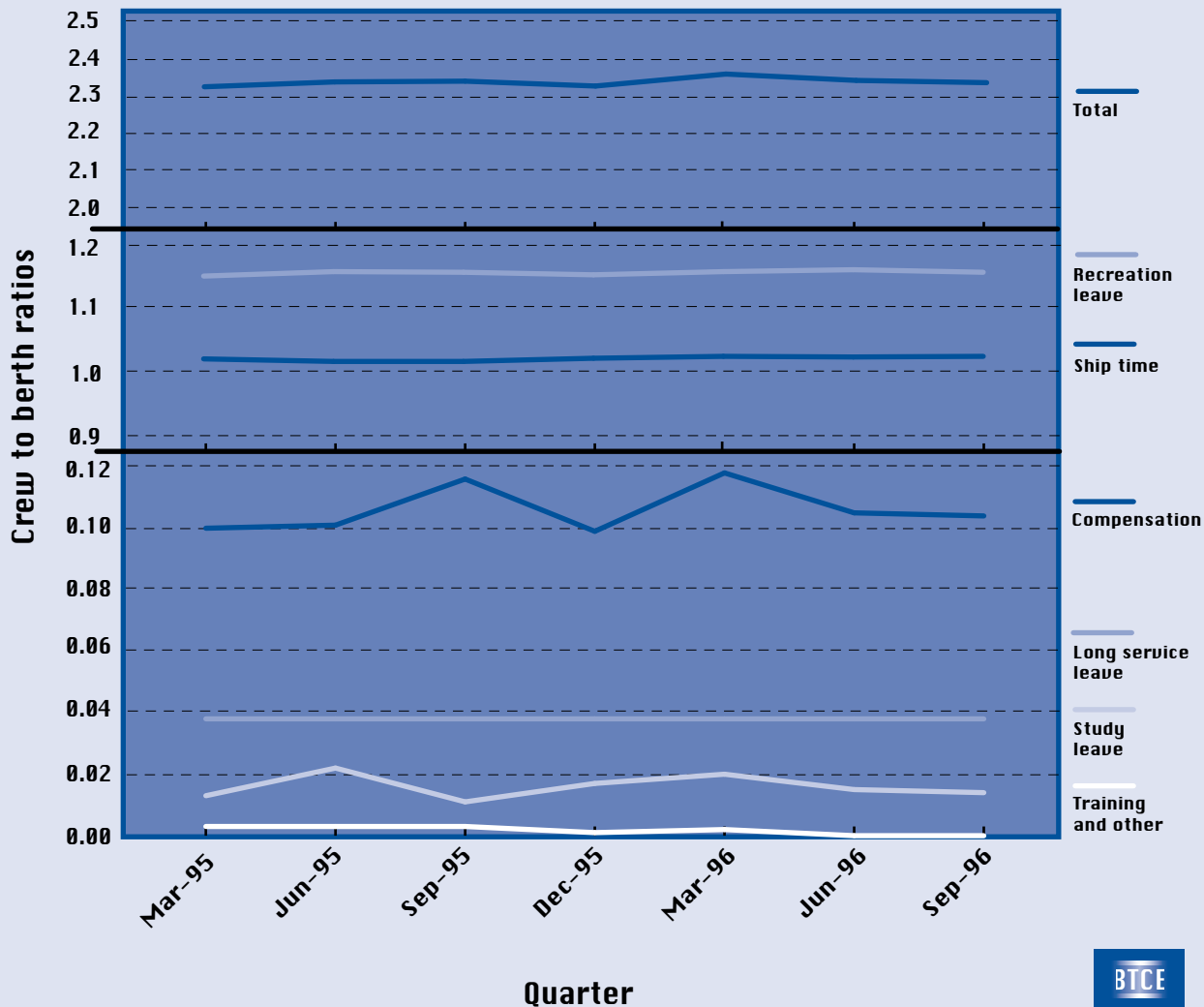
*Notes To the end of the September quarter 1992, award shift breaks are included in the measure of time which is used to calculate the net rate and the crane rate. From the September quarter 1993, award shift breaks are excluded from the measure of time in these two indicators. This means that the rates for the earlier period would be higher if they had been prepared on the same basis as the rates for the period from the September quarter 1993. Data are unavailable for December quarter 1992 to June quarter 1993.*

**FIGURE 7 CREW TO BERTH RATIOS—AUSTRALIAN MERCHANT SHIPPING**



**GO BACK TO TEXT CREW TO BERTH RATIOS**  
**-Merchant shipping**

**FIGURE 8 CREW TO BERTH RATIOS—AUSTRALIAN OFFSHORE SHIPPING**



**GO BACK TO TEXT** CREW TO BERTH RATIOS  
-Offshore shipping

## ABBREVIATIONS

AGPS	Australian Government Publishing Service
BTCE	Bureau of Transport and Communications Economics
MIRA	Maritime Industry Restructuring Agreement
SIRA	Shipping Industry Reform Authority
teu	Twenty foot equivalent unit
WIRA	Waterfront Industry Reform Authority

## REFERENCES

BTCE 1993, *Port Interface Cost Index*, Report 84, AGPS, Canberra.

## DEFINITIONS

**Elapsed time**—the total time the ship is alongside the berth offering for work whether worked or not, measured from labour first ordered to last labour ashore.

**Elapsed rate**—the number of teus or containers moved per elapsed hour.

**Net time**—the elapsed time minus the time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays or shifts not worked at the ship operator's request.

**Net rate**—the number of teus or containers moved per net hour.

**Crane rate**—the number of teus or containers moved per crane per net hour.

## ACKNOWLEDGMENTS

Contributors to this issue of *Waterline* were Kym Starr, Norman Wuest and Gita Curnow. The Bureau is particularly grateful for the assistance of the Maritime Division of the Department of Transport and Regional Development, the Association of Australian Ports and Marine Authorities, the ship operators that provide data for crew to berth ratios, and the stevedoring companies Patrick, P&O Ports and SeaLand.

**For further information on this publication, please contact Mr Kym Starr on Tel (06) 274 6857, Fax (06) 274 6816, email: [kstarr@email.dot.gov.au](mailto:kstarr@email.dot.gov.au)**

**This publication is available free of charge from the Manager, Information Services, Bureau of Transport and Communications Economics, GPO Box 501, Canberra, ACT, 2601, Australia. Tel (06) 274 6846.**

**Internet:**

**<http://www.dot.gov.au/programs/btce/btcehome.htm>**

ISSN 1324-4043

© Commonwealth of Australia 1996. This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced by any process without prior written permission from the Australian Government Publishing Service. Requests and inquiries concerning reproduction and rights should be addressed to the Manager, Commonwealth Information Services, Australian Government Publishing Service, GPO Box 84, Canberra, ACT 2601.

