bulk solids handling Volume 3, Number 1, March 1983

Port Kembla — A State of the Art Coal Port

Paul Soros, USA

Criteria

The new Port Kembla coal loader, dedicated on November 22, 1982, was developed to satisfy the following criteria:

Superior environmental protection

Located between industrial Port Kembla and residential Wollongong, adjacent to the municipal beach and golf course, public interest was very strong. The Government pledged to the local community environmental protection standards superior to any other coal port in the world.

Capacity

Minimum annual capacity of 15 million tons for 16 grades of coal in Phase I, with provision to expand to 25 million tons in Phase II. Phase I to load 120,000 DWT ships to full draft, 160,000 DWT ships to partial draft.

One hour train turn-around time

Environmentally acceptable unloading of 200,000 trucks a year

The old facility handled trucks around the clock. Restricting truck unloading to daylight hours plus other environmental improvements were important factors in gaining community acceptance.

High reliability

It was important to guard the coal industry against the kind of disruptions experienced at other ports due to fires or breakdown of major machines.

Ease of maintenance and clean-up

Early completion

No budget over-runs

It was essential to avoid the type of cost over-runs experienced in the construction of coal ports.

Competitive per ton capital cost

To maintain the competitive position of New South Wales coal, the approved budget had a capital cost of $9.00 per ton of annual capacity, including dredging, contingency and escalation.

Unique Features and Solutions

To satisfy the criteria required, the creation of a 15 million ton per year coal port that would be so economical to construct that it would compensate for the cost of superior environmental controls was required. To fulfill these demands, the engineers, Soros Associates, and their Australian affiliate, Soros-Longworth & McKenzie, developed a series of advances in the state of the art of environmental controls and coal handling technology:

- 1 hour train turnaround with highest capacity in-motion unloading system
- Night traffic eliminated; 200,000 trucks a year unloaded in daylight
- 3 lane highway over covered storage lets 9 trucks dump simultaneously
- All trucks washed to prevent spilling coal dust on roads
- Landscaping of 10,000 trees, 60,000 shrubs shielded truck operation
- Waiting time between trains eliminated by first multiple stacker system
- Coal treated chemically to bind free dust and form surface crust
- Dual water sprays compensate for all wind speeds and directions
- Computer controls spraying based on wind, temperature, humidity and inventory
- No dust from bulldozing, because all coal reclaimed by bucketwheel
- Largest coal bucketwheel reclaimer, built to special criteria of Soros Associates
- Second bucketwheel provided for complete back-up
- First twin travelling shiploaders can switch holds without interrupting loading
- First shiploaders with dust removal by washdown in slurry form
- Automated recirculation for reorganization of coal piles
- System can operate with any type of machine out of service

Realization

The following photographs illustrate main features of the completed facility:

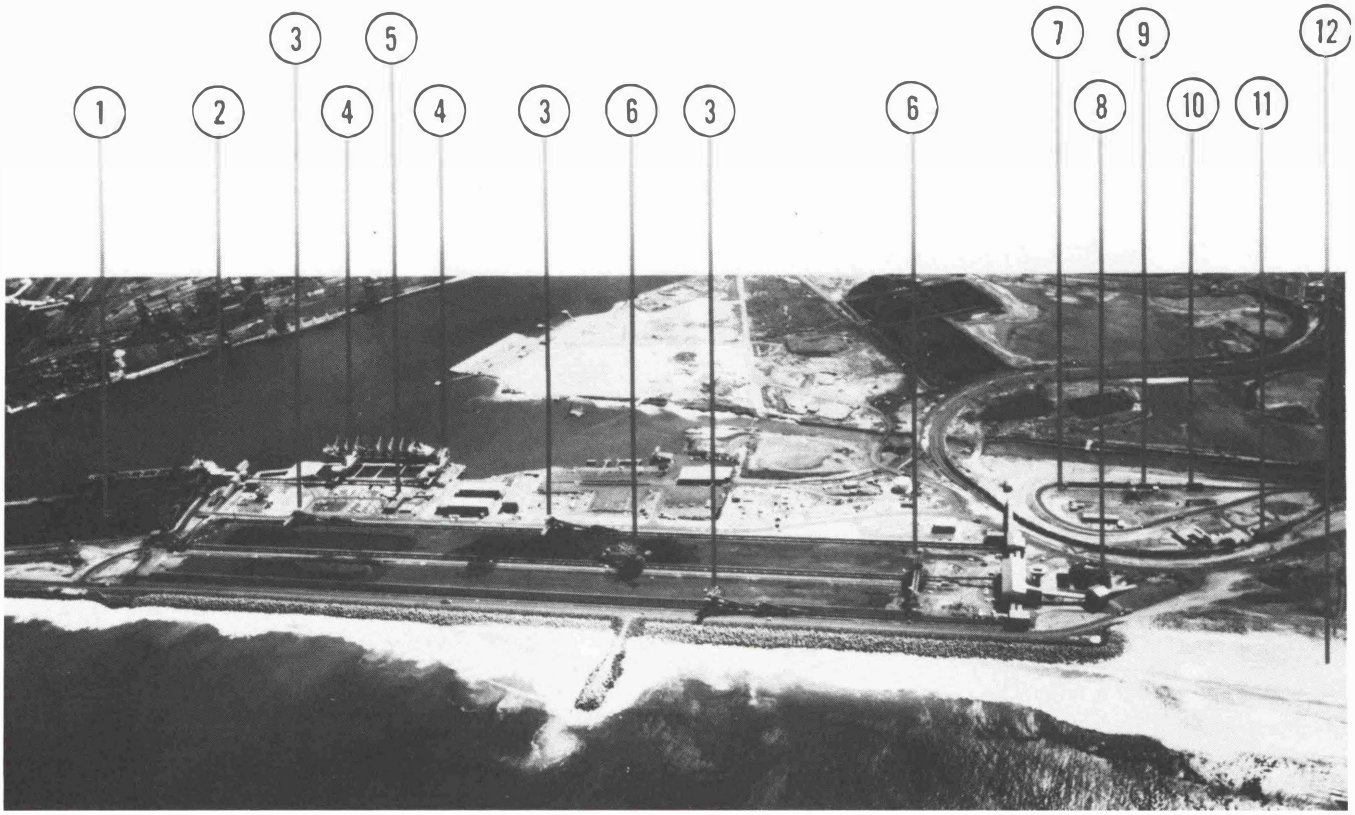

Fig. 1: Legend: 1 — Old Coal Loader, 2 — Sampling Plant, 3 — Stackers, 4 — Shiploader, 5 — Administration & Laboratory, 6 — Bucketwheels, 7 — Covered Slot Storage, 8 — Settling Ponds, 9 — Truck Dumping, 10 — Truck Wash, 11 — Train Unloading, 12 — Public Beach.

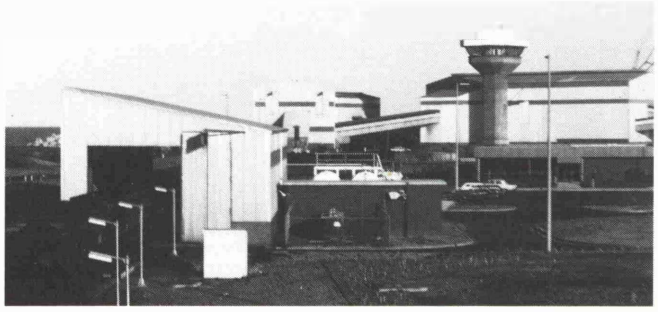

Fig. 2: 4,400 TPH in-motion train unloading. Pit size is greatly reduced by novel take-away system. Transfer stations have unobstructed ground floors for ease of clean-up.

Fig. 4: Different grades of coal can be dumped by 9 trucks at the same time. Trucks are controlled by traffic lights mounted on the wind screen.

Fig. 3: View from receiving control tower of 3 lane highway on top of covered slot storage. Large door in the center is crane access to maintenance bay for 2,000 TPH rotary plows.

Fig. 5: After dumping, trucks are washed to prevent spilling dust on public roads. Extensive landscaping of 10,000 trees and 60,000 shrubs provides visual and noise shield.

Fig. 6: 2 stackers served by 1 conveyor are part of the first multiple stacking system which eliminates waiting between trains. While 2 stackers stack coal unloaded by train and truck, the third is positioned to be ready for the next train arrival. Special berm protects runway from slumping coal.

Fig. 7: All coal is treated with a chemical that binds free dust and forms a surface crust. Pioneering dual spray system is computer controlled on the basis of inventory, temperature, humidity, wind speed and direction. Yard conveyors are elevated for ease of clean-up.

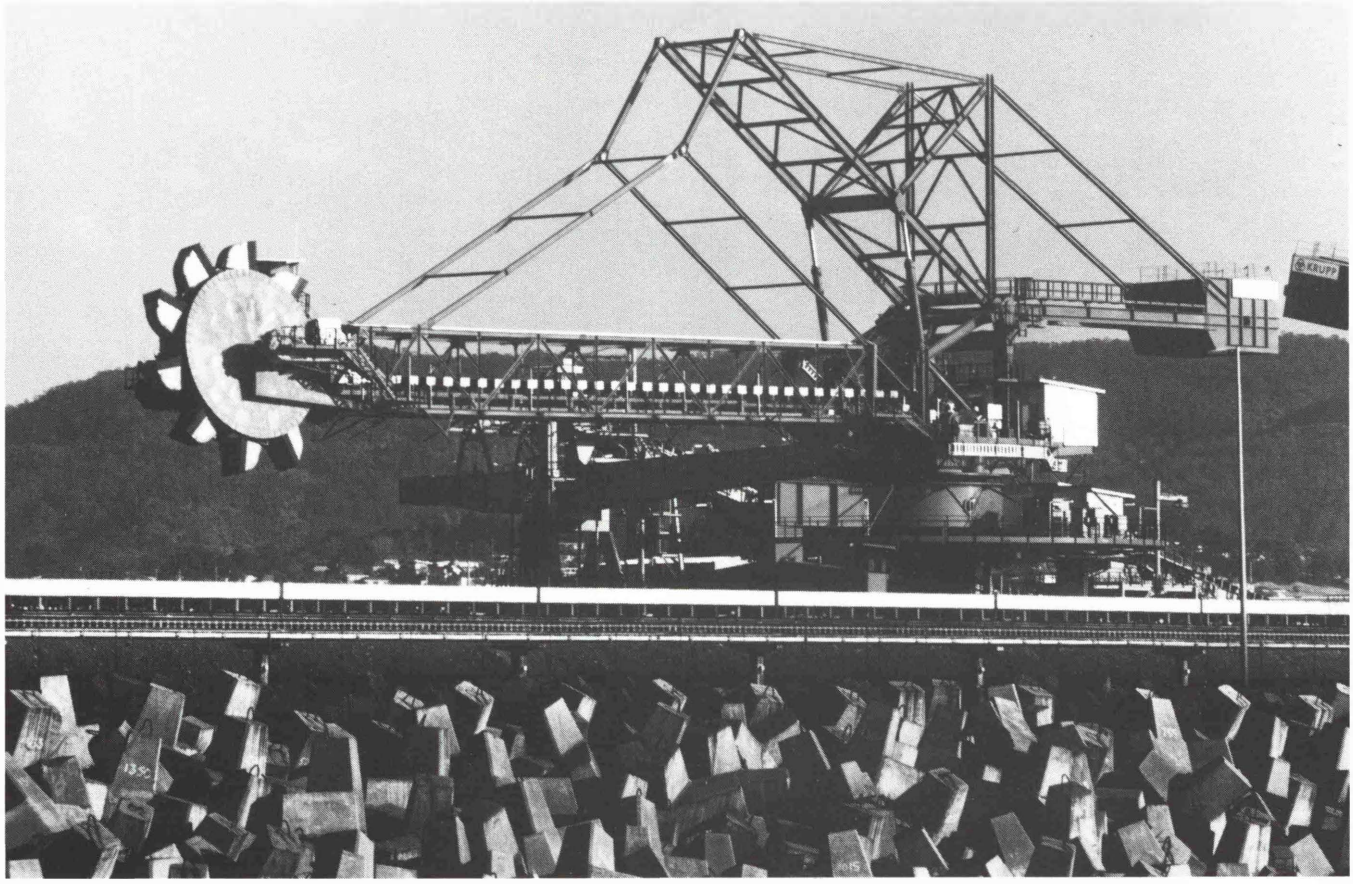

Fig. 8: 6,600 TPH bucketwheel is largest for coal. It incorporates a surge bin and other special criteria developed by Soros Associates. There is no dust from bulldozing because special berms make all coal reclaimable by bucketwheel.

Fig. 9: View from shiploading control tower show switch bins used in conjunction with the dock conveyor and the recirculating conveyor for purging the system and automated reorganization of the stockpiles.

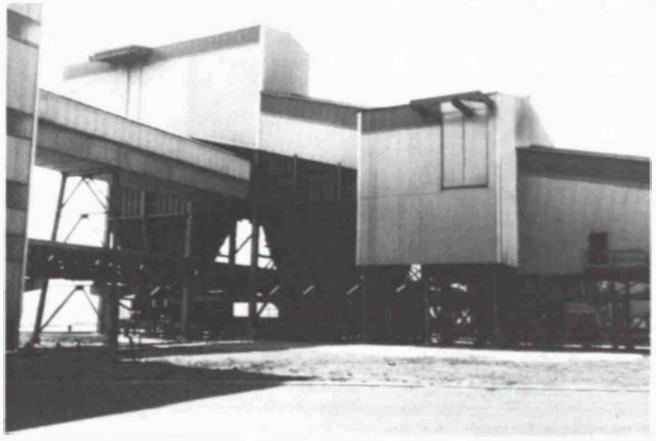

Fig. 10: Approach conveyors to pier with movable head feeding either switch-bins or horizontal weigh conveyor to sampling plant.

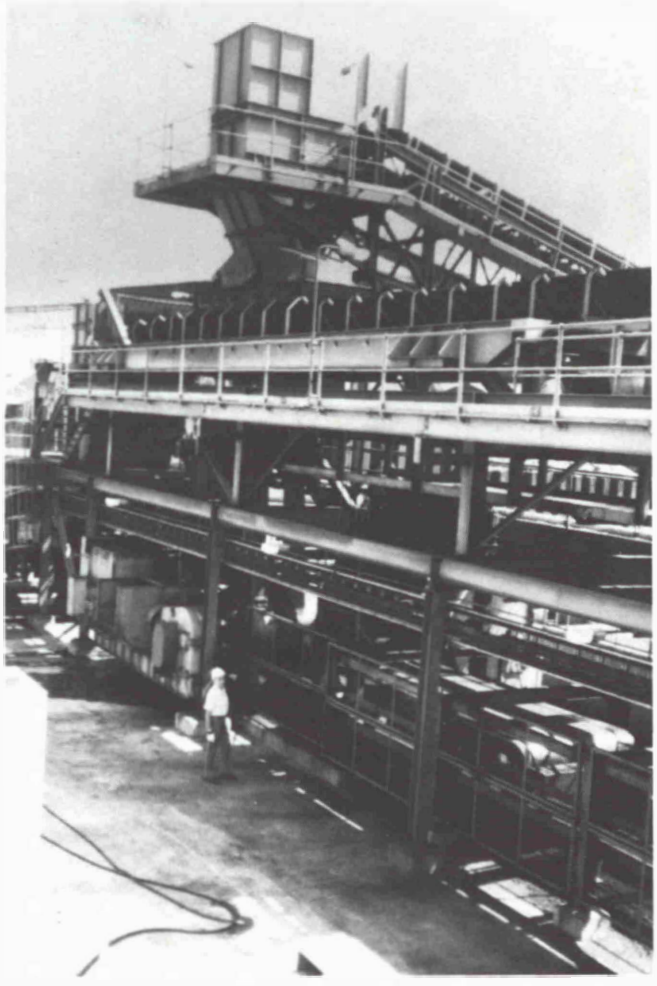

Fig. 12: Head end of recirculating conveyor and reversible yard conveyor drive station with moving head to permit future expansion.

Fig. 11: 6,600 TPH conveyor to shiploaders is on left. Recirculating conveyor feeding the reversible yard conveyor is on right.

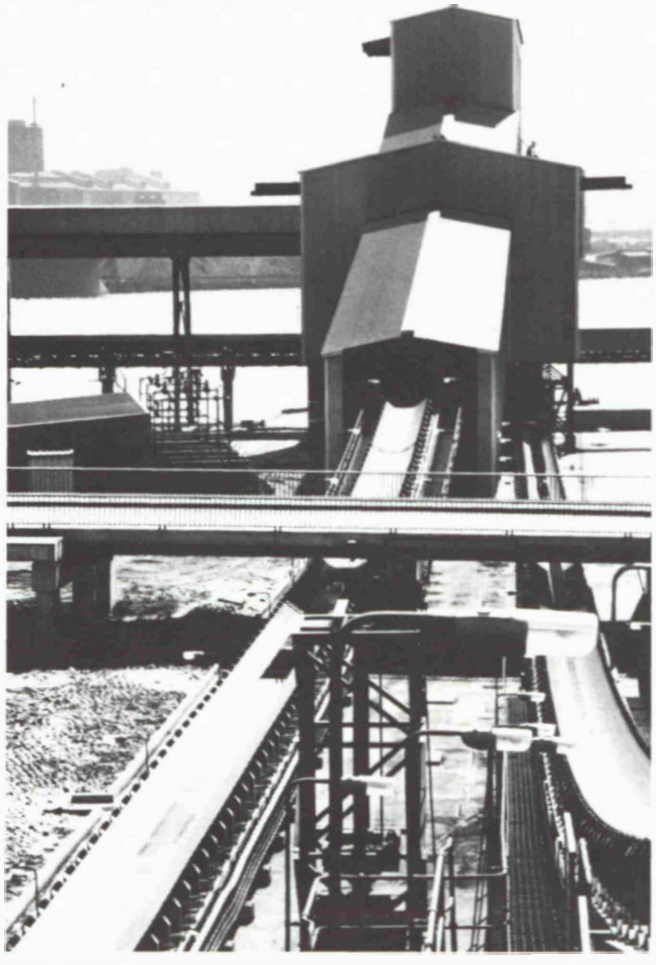

Fig. 13: Shiploading control tower with mimic panel, communication system and computer for programmable controllers, stockpile management, simulation, and data logging.

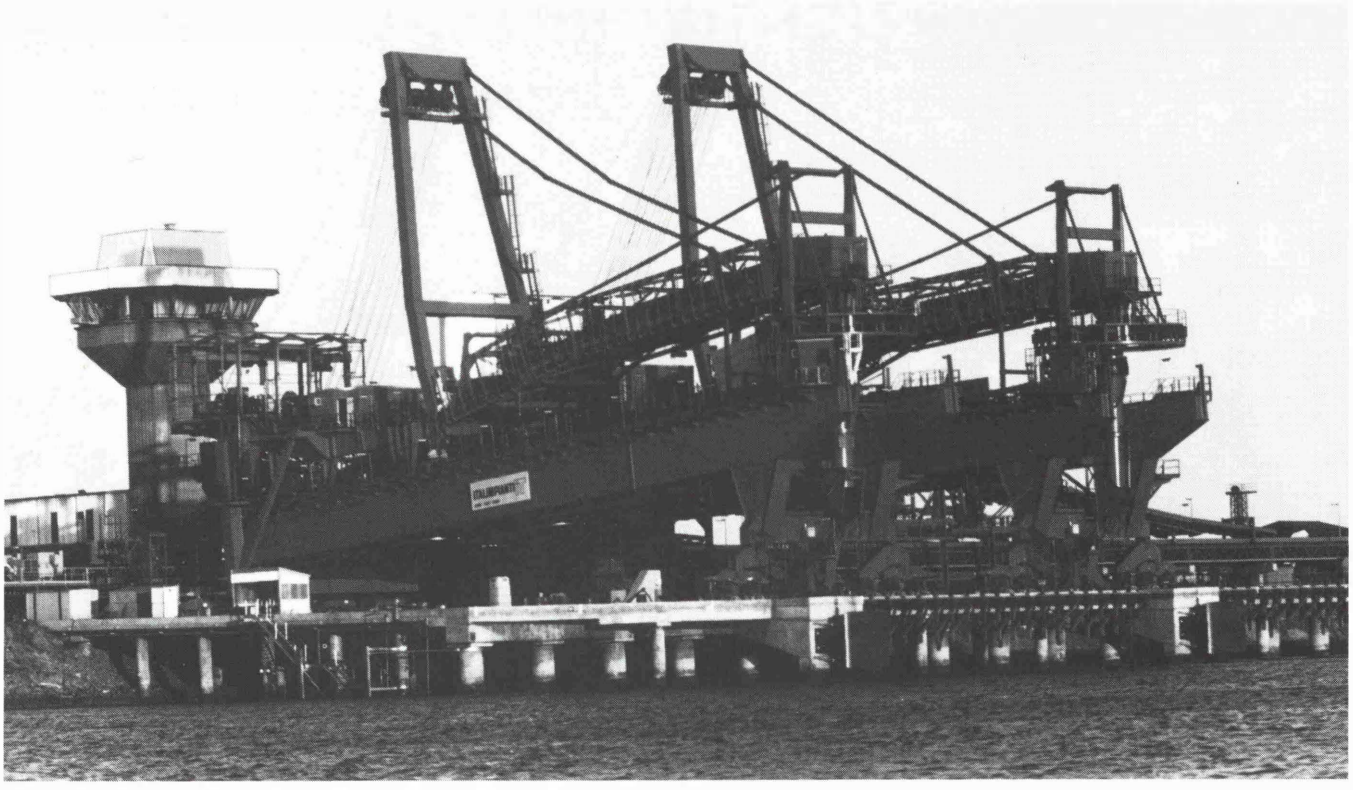

Fig. 14: First twin travelling shiploaders fed by a single dock conveyor can switch between ships' holds without interrupting the loading. Rotating spoon and loading boom is accessible for maintenance from land.

Fig. 15: Shiploaders are the first with launders that permit washdown and pumping away coal dust in slurry form. Solid decks at ends of the pier are washdown and maintenance areas. Public beach, golf course and residential areas are visible in background.

Construction History

The construction authority was the New South Wales Public Works Department, on behalf of the Maritime Services Board of N.S.W. who owns and operates the facility.

The project was planned to be permitted, designed, built and started up in 36 months, at a budget of $139 million, including escalation and 7 1/2 % contingency. The above figure includes $17 million for dredging.

Detail design drawings and specifications were prepared for materials handling equipment, structures, machines, weighing and sampling systems, marine facilities, sitework, roads, maintenance, shops, administration and control buildings, electric power distribution and lighting, landscaping, environmental mitigation measures and centralized computer control of the materials handling system and the coal dust suppression system.

Multiple lump sum contracts awarded simultaneously to assure total cost prior to start of construction were 4 % below estimate.

The project was completed 1 month ahead of schedule and $18 million below budget.

References

[1] Soros, P., and Osman, M., "Port Kembla — Export Coal Facility On-Stream by 1982" Bulk Systems, October 1979

[2] Soros, P., and Osman, M., "An Environmentally Acceptable Coal Port", Ports 80 Conference/ASCE, Norfolk, Virginia, May 1980

[3] Soros, P., and Ferguson, J., "Port Kembla — Contracts Awarded", Bulk Systems, October 1980

[4] Soros, P., "Port Kembla Coal Terminal", Bulk Solids Handling Vol. 1, No. 4 (1981) pp. 587—594

[5] "NSW: Catering for Volume Exports", Bulk Systems International, October 1981

[6] Smyth, M., "Fewer Trucks but More Trains", Engineers Australia, October 16, 1981

[7] Gunderson, R., "Minis to Automate Port Kembla Coal Loader in Australia", Mining Engineering, November 1981

[8] Kemper, H., "Biggest-Ever Bucket Wheel Reclaimers in the Coal Terminal of Port Kembla", Bulk Solids Handling, Vol. 1, No. 4, (1981), pp. 595—596

[9] Guarino, R., "Stacker and Shiploader at the Port Kembla Coal Terminal", Bulk Solids Handling, Vol. 1, No. 4, pp. 601—603

[10] "Port Kembla Under Test, Dedication Soon", International Bulk Journal, October 1982

Acknowledgement

The author wishes to gratefully acknowledge the cooperation of the New South Wales Public Works Department management in authorizing this publication and to fellow employees of Soros Associates who graciously assisted in typing, editing, and contributing in other ways to the completion of this article.