1926.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

Senator Reid

Pursuant to Statute
By Command
In return to Order
President of the Senate
19th May, 1926.

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

REPORT

TOGETHER WITH

MINUTES OF EVIDENCE

RELATING TO THE

PROPOSED EXTENSION OF THE TRANS-AUSTRALIAN RAILWAY FROM PORT AUGUSTA TO RED HILL (SOUTH AUSTRALIA), AND THE LAYING OF A THIRD RAIL TO PROVIDE A RAILWAY OF 4-FT. 8½-IN. GAUGE ON THE SOUTH AUSTRALIAN 5-FT. 3-IN. GAUGE RAILWAY FROM RED HILL TO THE CENTRAL RAILWAY STATION, ADELAIDE.

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THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

EXTENSION OF TRANS-AUSTRALIAN RAILWAY FROM PORT AUGUSTA TO RED HILL (S.A.) AND LAYING OF THIRD RAIL BETWEEN RED HILL AND ADELAIDE.

REPORT.

The Parliamentary Standing Committee on Public Works, to which the House of Representatives referred, for investigation and report, a proposal for the extension of the Trans-Australian railway from Port Augusta to Red Hill (South Australia), and the laying of a third rail to provide a railway of 4-ft. 8½-in. gauge on the South Australian 5-ft. 3-in. gauge railway between Red Hill and the Central Railway Station, Adelaide, has the honour to report as follows:

INTRODUCTORY.

1. Railway communication between Port Augusta and Adelaide is at present maintained by a 3-ft. 6-in. gauge line which, starting from Port Augusta, runs easterly and north easterly over the Flinders Range to Quorn, then south-easterly, north-easterly, and again south easterly to Terowie. Here it junctions with the 5-ft. 3-in. gauge line which runs in a general southerly direction to Adelaide. The length of this line is approximately 260 miles, and it rises at places to nearly 2,000 feet above sea level.

2. For the last thirteen or fourteen years, the South Australian Government has had under consideration the question of the construction of a 5-ft. 3-in. gauge railway from Adelaide to Port Augusta, via Salisbury, Long Plains, Snowtown, Red Hill, and Port Germein, so as to provide a more direct route from Port Augusta to the capital. This line would have a total length of about 190 miles, and would rise at its highest point to about 455 feet above sea level.

3. The construction of this line formed the subject of several inquiries by the State Parliamentary Standing Committee on Railways, and the first section between Salisbury and Long Plains, a distance of about 47 miles from Adelaide, was completed in 1917, and a further section to Red Hill—107 miles from Adelaide—was completed in 1925.

4. In 1921, a Royal Commission reported on the question of adopting a uniform gauge for Australia. The Commissioners regarded the section between Port Augusta and Terowie as the most undesirable of the lines connecting the capitals, and recommended the construction of a 4-ft. 8½-in. gauge line from Port Augusta to Lochiel (the then terminus), and the conversion to 4 ft. 8½ in. of the 5-ft. 3-in. line from Lochiel to Salisbury, making the latter station the point of change for passengers over the Trans-Australian line.

5. When the Trans-Australian line was built, it was not anticipated that it would remain for such a long period suspended between two narrow-gauge sections, and it was confidently expected that long before now broad-gauge connexions would have been built between Port Augusta and Adelaide and between Kalgoorlie and Perth.

6. The presence of these narrow-gauge connexions is stated to be very detrimental to the traffic on the Trans-Australian line, and as it is apparently not now the intention of the South Australian Government to continue their broad-gauge railway on this section any further north from Adelaide than Red Hill, or possibly Port Pirie, the Commonwealth approached the South Australian Government in an endeavour to overcome existing disabilities.

Agreement with South Australia.

14 The agreement arrived at between the Governments of the Commonwealth and of South Australia, and subsequently ratified by the Commonwealth and South Australian Parliaments, provided, *inter alia*:—

(i) The Commonwealth will, at its own expense, construct a railway on the 4-ft. 8½-in. gauge from Port Augusta to Red Hill;

(ii) The route of the railway will, from a point near Port Pirie to Red Hill, be as far as practicable the route recommended by the Railways Standing Committee of the State;

(iii) The State will, at the expense of the Commonwealth, during the construction of the railway from Port Augusta to Red Hill, lay a third rail on the 5-ft. 3-in. railway of the State from Red Hill to the Central Railway Station, Adelaide;

(iv) If in the opinion of the Railways Commissioners of the Commonwealth and of the State it would be impracticable or dangerous on any portion of the railway between Adelaide and Red Hill to use a railway with a third rail, then a separate track on the 4-ft. 8½-in. gauge shall be constructed by the State at the expense of the Commonwealth over a route to be determined by agreement between the Commissioners;

(v) The Commonwealth will, at the expense of the State, during the construction of the railway from Port Augusta to Red Hill, lay from a point near Port Pirie to Red Hill a third rail so that there will be a continuous railway on the 5-ft. 3-in. gauge from Adelaide to the said point near Port Pirie;

(vi) The Commonwealth will not accept goods for transport where the transportation begins at Adelaide or at the point of crossing by the Commonwealth railway of the State railway to Port Pirie or between those places and ends at the Port Pirie crossing or Adelaide or between those places.

Description of Country.

15. The land between Port Augusta and Port Pirie is not generally of first class quality, being of a sandy nature, and when cleared for cultivation is inclined to drift in dry weather. A number of sheep and a few cattle are carried in the vicinity of Port Augusta, and the country improves as it rises on the western slopes of the Flinders Range. Some wheat is grown around Port Germein and extending towards Port Pirie. From the vicinity of Port Pirie, the land extending towards Red Hill improves in quality for wheat-growing, being less sandy and of a firmer nature.

16. *Very little clearing will be required for the proposed line.* Where clearing has not yet been carried out, the timber is light, and where the land has been cultivated, practically no clearing will be necessary.

17. Owing to the country being generally flat and slightly undulating throughout, the principal earthworks will be light. Very little rock is expected to be met with in the excavations for cuttings and side-cuttings, and the soil to be excavated is of a soft and sandy nature for the greater portion of the distance.

Bridges.

18. A number of shallow creeks rising in the Flinders Range and emptying into Spencer's Gulf will be crossed. These will necessitate shallow bridging of short spans (22 feet). This class of bridging will amount in all to about 1,625 lineal feet.

19. Baroota Creek, a little over 41 miles south of Port Augusta, which has fairly steep banks, will require a bridge of three 40-ft. spans, and the main channel of the Broughton River, 67 miles 17 chains south of Port Augusta, which is both narrow and deep, will necessitate a single span bridge of 100 feet.

Grade.

20. The ruling grade on the existing line via Terowie is 1 in 40, but the ruling grade on the proposed line will be 1 in 100, and with the exception of the curve at the turn-off from the Port Augusta-Quorn line at 4¼ miles from Port Augusta, where the radius of curve is 24 chains, the sharpest curve will be 40 chains radius.

Sleepers.

21. The sleepers on the line from Port Augusta to Port Pirie will be 8 ft. long x 9 inches x 4½ in., and from Port Pirie to Red Hill, where they will carry a third rail laid for the use of the State, the sleepers will be 8 ft. 6 in. long x 9 in. x 4½ in.

On the section between Red Hill and Adelaide, where a third rail will be carried for the use of the Commonwealth on the State track, the sleepers already in position are the standard sleepers of the South Australian broad-gauge track, which are 8 ft. 6 in. long x 10 inches x 5 in.

Inquiries were made by the Committee as to the possibility of using concrete the opinion obtained was that, although careful attention is being paid to the experi made with concrete sleepers, the results so far obtained do not warrant the adoption of for a work such as now proposed.

The country to be traversed by the line does not offer any prospect of obtai locally, and it is the intention to call tenders in all States for the supply of the num

Water Supply.

22. From information supplied to the Committee, it appears that no difficu anticipated in respect of the water supply between Port Augusta and Red Hill. it is stated that trains could be run from Port Augusta to Red Hill without replenish

Flood Waters and Drift Sand.

23. It was stated in evidence that no serious difficulties in regard to floo anticipated. At Stirling, near Port Augusta, where the proposed railway will leave line, there is some possibility of flood waters, and steps are being taken to provi contingency.

Some trouble may also be caused by drift sand at various points, but, so far that is being provided against.

Rolling-stock.

24. The additional rolling-stock required for the new line is estimated to co It will consist of:—

Three sitting-up corridor passenger coaches for wayside passengers betwee Port Augusta and Adelaide .. ..
Three rail motor coaches to seat 80 first class and 60 second class passenger
Four goods brake vans .. ..
Five covered trailers for parcels, to be attached to rail motors ..
Fifty cattle wagons .. ..

No additional locomotives are said to be required.

Route.

25. In the agreement arrived at between the Commonwealth and the Sta Australia, in regard to the construction of this proposed railway, it is stipulated tha

5. (*b*) The route of the said railway shall, from a point near Port Pirie be as far as practicable the route recently recommended by the Railwa Committee of the State. The point at and the manner in which the said cross the State railway to Port Pirie shall be determined by agreement Railways Commissioners of the Commonwealth and of the State.

26. The Committee perused the report of the State Railways Standing Comm September, 1924, which, dealing with the then projected line as a 5-ft. 3-in. gauge State purposes, recommended that at about the 17½-mile point north of Red Hill the swing slightly to the north-west, traverse a 3-chain road, and enter Port Pirie fro giving the line a length of 29¼ miles from Red Hill. The route as now suggested from point north of Red Hill runs generally northerly and passes about 2½ miles to the Pirie, at a distance of approximately 1 mile 50 chains from the Solomontown railw the distance of this point from Red Hill being about 27 miles.

27. Representations were made by witnesses at Port Pirie that it would be interests of the town to bring the line at least as close to the town as the Solomonto station. As the terms of the agreement preclude the Commonwealth from participa goods traffic between Port Pirie and Adelaide, and as Port Pirie is at present served by gauge railway, and when this line is laid down will also have a 5-ft. 3-in. State Committee was not impressed with the argument used. Moreover, as it was pointe this is a section of the through Trans-Australian railway, and the lengthening of the li 2½ miles, in addition to the extra capital cost of probably £20,000, would involve the Com in an additional £200 a year for maintenance for all time; further, that the rou recommended had been arrived at by agreement between the Railways Commissio Commonwealth and the State, the Committee after careful consideration saw n recommend any alteration.

28. The decision arrived at by the Committee in connexion with this matter is shown by the following extract from its Minutes of Proceedings :—

Mr. Lacey moved—

That the route of the proposed railway as submitted be run as from about the 17½-mile point north of Red Hill more westerly so as to traverse the 3-chain road and enter Port Pirie as recommended by the State Parliamentary Standing Committee on Railways in its report of 10th September, 1924.

Seconded by Senator Reid (*pro forma*).

The Committee divided on the motion—

Aye (1).	Noes (7).
Mr. Lacey.	Senator Barnes. Senator Reid. Mr. Cook. Mr. Gregory. Mr. Mackay. Mr. McGrath Mr. Seabrook.

And so it passed in the negative.

29. During its inspection of the route, the attention of the Committee was drawn to the fact that between Port Pirie and Port Germein, the line swung somewhat to the east and cut across agricultural land Evidence was adduced to show that at this locality at certain seasons the working of the land for agricultural purposes made it liable to give rise to sand drift, which might give trouble to the railway or at least necessitate larger maintenance costs. Another route was pointed out nearer the coast, where it was suggested that the line might be located on firmer ground, and on property which would be almost wholly Crown land. This, it was claimed, would minimize the risk of sand drift, and at the same time avoid any unnecessary interference with privately-owned properties.

30. The Committee was favorably disposed towards this alteration, and unanimously decided to recommend that careful consideration be given to the question of altering the route of the proposed railway north of Port Pirie so as to locate it closer to the coast and thus avoid severance of agricultural holdings and possible danger from drifting sand.

31 During the progress of the Committee's investigations it was urged by representatives of Crystal Brook that the proposed railway should be taken through that town instead of going north-westerly from Red Hill through the Wandearah district. It was ascertained in evidence, however, that Crystal Brook already has railway facilities not possessed by the Wandearah district; that to take the line through Crystal Brook would lengthen the through journey by approximately 3 miles without any advantage to the Commonwealth, and that the State railway officials were not prepared to recommend that the line be taken through Crystal Brook; further, that the last report of the State Parliamentary Standing Committee on Railways definitely reported in favour of the Wandearah route to the exclusion of Crystal Brook. Under these circumstances, the Committee was not prepared to make any recommendation in the direction desired.

Third Rail.

32. A large amount of evidence was taken in regard to the proposal to lay, at the expense of the Commonwealth, a third rail on the State 5-ft. 3-in. track from Adelaide to Red Hill, to permit of the Commonwealth 4-ft. 8½-in. trains running over it, and to lay, at the expense of the State, a third rail on the Commonwealth's 4-ft. 8½-in. track from Red Hill to Port Pirie, to permit of the State's 5-ft. 3-in. trains running over that section; and considerable difference of opinion was found to exist amongst the witnesses examined as to the practicability or advisability of taking this course.

The Committee realizes that in approaching this project it is dealing with rather a unique problem, as all the evidence received indicated that in no other part of the world is there any great length of mixed gauge track laid where the third rail would be in such close proximity to the outer rail as would obtain with the 5-ft. 3-in. and 4-ft 8½-in. gauges.

33. The proposal was strongly supported by the two Railways Commissioners and the Acting Chief Engineer of the South Australian Railways, and by the Commonwealth Railways Commissioner (himself an engineer), the Engineer-in-Chief of Way and Works, the Chief Mechanical Engineer, and the Chief Traffic Manager of the Commonwealth Railways, as well as by two private engineers. Strong objections to its adoption were urged by the Chairman. Victorian Railways Commissioners, the Chief Engineer of Way and Works and another engineer of the Victorian Railways, one private engineer, and a railway contractor.

34. Summarized, the main objections urged against the employment of a th

(*a*) Increased risk of accident due to portion of loading or parts of rollin a lodgment on the plane surface of 9½ inches presented by the rails;

(*b*) Accumulation of sand, debris, or dropping of portions of rollin flangeway between the rails;

(*c*) Additional risk in points, crossings, and interlocking devices;

(*d*) Greatly increased cost of installing reliable points and crossings;

(*e*) Trouble in seating fish-plates;

(*f*) Fish-bolts would require to be inserted from the outside, and all located between the rails, involving a departure from establis

(*g*) Difficulty would occur in driving dog-spikes in the limited space adjustment of badly-driven spikes could not be easily rectifie

(*h*) With 100-lb. rails, the Australian standard design for fish-pla modification;

(*i*) Cross-dogging could not be effected, and more spike holes would ha thus tending to shorten the life of sleepers.

35. The Committee carefully considered all these objections, and the witnesses opposed to and favorable to the third rail system in regard to all the point its adoption. It was found that even some of the opponents did not attach m to some of the objections raised.

In regard to (*a*) and (*b*), it was pointed out that the possibility of accident the causes stated was a very remote one, and the risk had been exaggerated, m risk there might be would be eliminated by a proper system of line inspection.

In regard to (*c*) and (*d*), the Chief Railways Commissioner of South Australia that he could devise a system of points and crossings which would give as safe normal track.

It was further stated that the only difficulty likely to be met with was in larg and in any instance where the Commonwealth Railways Commissioner had an satisfactory points and crossings in those positions, it was competent for him to State Railways Commissioner to take a 4 ft. 8½ in. track around such stations on a and so overcome any possible risk.

36. In a highly technical matter of this description, the Committee feels th on the competent railway authorities of the Commonwealth and of the State, and are perfectly satisfied that every possible danger to the public is eliminated, is ce the matter in their hands.

37. In regard to (*e*), (*f*), and (*g*), the Committee, to satisfy itself on these length of rails laid on sleepers complete with fish-plates and bolts, and is quite sa difficulties said to exist can be satisfactorily overcome. Even if, in renewing bolts future, bolts have to be inserted from the outside in some cases, the Committee great harm would arise. The practice of fixing fish-bolts alternately from outside the rails was found by observation to be in no way universal, and even the opponen rail system attached no great importance to the matter.

38. In regard to (*h*), the Committee realizes that some difficulty may ari Augusta to Salisbury, a distance of approximately 168 miles, the rails to be used will of 80 lbs. to the yard, but the Chief Railway Commissioner, South Australian intimated that between Salisbury and Adelaide, a distance of about 13 miles, it is to replace the existing 80-lb. rails by 100-lb. rails.

If a third-rail track as proposed be laid with 80-lb. rails, the distance sepa adjacent rails will be 3¾ inches at the heads of the rails and 1¾ inches at the flanges. rails, these distances will be reduced to 3½ inches and ¾ inch respectively. W standard fish-plates, for 80 lb. rails, the distance between the flange of the fish- flange of the adjacent rail would be about ¼ inch. With standard fish plates for 10 flange of the fish-plate would foul the flange of the rail to the extent of ¼ inch.

39. A modification of the design or a shearing of the standard fish plate ma resorted to, but from the evidence placed before it the Committee is satisfied t present no insuperable difficulty, and is a detail which might be left to the railway

40. In regard to (*i*), the Committee does not attach much importance to the o as the weight of evidence was to the effect that the inclusion of a third rail in a tra weaken sleepers to any appreciable extent, nor lead to any considerable increase upkeep.

41. During the course of the inquiry, it was apparent that all railway witnesses examined realized the advantages attached to bringing the Trans-Australian train right into Adelaide, and opinions were expressed that this offered an excellent opportunity for taking the first step in the unification of gauge proposal by converting the South Australian 5-ft. 3-in. section between Red Hill and Salisbury to the 4-ft. 8½-in. gauge. Certain difficulties in giving effect to this proposal are, however, apparent, as the break of gauge would be involved on the South Australian system at every junction between Red Hill and Salisbury, and the South Australian Government would have to equip itself with certain 4-ft. 8½-in. gauge rolling-stock.

42. It was ascertained in evidence that most of the 3-ft. 6-in. gauge lines in the western system of the South Australian railways are in process of being converted to 5-ft. 3-in. gauge, and it appears to the Committee unfortunate that some arrangements could not have been made with the South Australian Government to have these lines converted to the 4-ft. 8½-in. gauge in compliance with the spirit of the decision arrived at as to the advantages which would follow the ultimate adoption of a standard 4-ft. 8½-in. gauge for the whole of the railways of the Commonwealth. However, this is a matter touching South Australian railway policy upon which the Committee has no wish to enlarge.

43. Some witnesses, even though opposed to the third-rail principle, admitted that it might be found advantageous in certain circumstances, and that during the period of unification of gauges of the Commonwealth would probably have to be used somewhat extensively as a temporary expedient. The Commonwealth Railways Commissioner stated in evidence that he regarded this proposal as a temporary arrangement, and would not be prepared to adopt it permanently.

COMMITTEE'S DECISION.

44. After considering the matter in all its aspects, the Committee agreed to recommend that the proposal for the extension of the Trans-Australian railway from Port Augusta to Red Hill and the laying of a third rail to provide a railway of 4-ft. 8½-in. gauge on the South Australian 5-ft. 3-in. gauge railway between Red Hill and the Central Railway Station, Adelaide, be approved.

The decision arrived at by the Committee in connexion with this matter is shown by the following extracts from its Minutes of Proceedings:—

Mr. Gregory moved—

That as an equally efficient service to that proposed could be obtained unattended by the risk involved in the combination of the 4-ft. 8½-in. and 5-ft. 3-in. gauges on the one track, and a saving of approximately £400,000 effected by the construction of a 4-ft. 8½-in. gauge railway from Port Augusta to Port Pirie, thus eliminating the proposal for a third rail from Red Hill to Adelaide—the Committee recommends that, pending the adoption of a uniform gauge, negotiations be opened up with the South Australian Government with a view to securing its approval of the Commonwealth constructing a 4-ft. 8½-in. gauge railway from Port Augusta to Port Pirie, the South Australian Government undertaking to extend the 5-ft. 3-in. gauge railway from Red Hill to Port Pirie and to provide a service to connect with the Trans-Australian train at Port Pirie from and to Adelaide and Melbourne, thus necessitating but one break of gauge from Kalgoorlie to Albury.

Seconded by Mr. Lacey.

The Committee divided on the motion—

Ayes (3).	Noes (5).
Mr. Cook.	Senator Barnes.
Mr. Gregory.	Senator Reid.
Mr. Lacey.	Mr. Mackay.
	Mr. McGrath.
	Mr. Seabrook.

And so it passed in the negative.

Senator Reid then moved—

That the proposal for the extension of the Trans-Australian Railway from Port Augusta to Red Hill (South Australia) and the laying of a third rail to provide a railway of 4-ft. 8½-in. gauge on the South Australian 5-ft. 3-in. gauge railway between Red Hill and the Central Railway Station, Adelaide, be approved.

The Committee divided on the motion—

Ayes (6).	Noes (2).
Senator Barnes.	Mr. Cook.
Senator Reid.	Mr. Gregory.
Mr. Lacey.	
Mr. Mackay.	
Mr. McGrath.	
Mr. Seabrook.	

And so it was resolved in the affirmative.

45. During the progress of its investigations, the Committee took evidence Wilkin, formerly Interlocking Engineer in the New South Wales Railway examined models submitted by him for dealing with break of gauge between 4 ft 3-in. railway tracks. The Committee was much impressed with the system recommends that careful consideration be given to this scheme before deciding points and crossings to be adopted.

ESTIMATES OF COST.

46. When this proposal was submitted to the Committee, the estimate a third rail on the section from Red Hill to Adelaide was set down by the Common Department, at £380,000, the work to be carried out by the South Aus Department at the expense of the Commonwealth. In hearing evidence Commissioner, South Australian Railways, however, the Committee was informed *Australian Railways estimate for this work was £450,000* made up as follows

Third rail on existing track	15
Permanent way, 4-ft. 8½-in. gauge	
Surface forming	
Fixed points	
Long timbers	
Leads	
Crossings	
Base-plates	
Water columns	
Red Hill transfer yard	
Abattoirs, stock arrangements	
Alterations to bridges, &c.	
Extras between Adelaide and Salisbury, account 100 lb. rail, &c.	
Land, &c.	1
	29
Engineering and supervision, 5 per cent.	
	30
Contingencies, 10 per cent.	
	3
Work in Adelaide yard	
	36
Signalling, (⅓ of total cost)	

Say, £450,000.

47. An effort was made by the Committee to arrive at a definite understan the difference arose, but without complete satisfaction.

The Chief Engineer of Way and Works, Commonwealth Railways, stated the South Australian estimate had been reduced by his Department as follows:

On Item of 4-ft. 8½-in. gauge line around stations and sidings, not including at Adelaide station .. .. ..
Accounted for by a deduction of 6½ per cent. stores charges, reduction of number of sleepers and quantity of ballast to comply with Commonwealth stan dard, and a deduction of 1s. per lineal yard in the cost of plate-laying.

On Item of laying a third rail on the 5-ft. 3-in. gauge, not including at Adelaide station, a reduction of 1
Accounted for by a deduction of 6½ per cent. stores charges, of 6d. per lineal yard in plate-laying and a reduction of ½-mile of third rail to be laid between Torrens River and the main platform at Adelaide

1

	£	£
Brought forward	19,532	
Miscellaneous items included in the special estimate for Adelaide station yard	940	
Freight transfer yard—Red Hill	8,000	
Land required	3,000	
On percentages allowed for plant and supervision	7,204	
Extra amount allowed by State as cost to Commonwealth to bring estimate up to round figures	11,324	
		50,000
To this sum it is claimed should be added .. .. .. by which the Commonwealth estimate was reduced in consequence of the South Australian Railway Commissioner undertaking to bear the cost of constructing the main platform in Adelaide station yard	..	20,000
		70,000

48. Although this explanation to some extent accounts for the difference, it is thought that such a disparity in estimates for the carrying out of the same work should not exist. However, the Committee has had the assurance of both the Commonwealth Railways Commissioner and the Chief Commissioner, South Australian Railways, that the utmost economy will be observed in carrying out the work, and that the Commonwealth will be debited only with actual amount expended. The Committee, however, is unanimously of opinion that on the completion of the work a detailed statement of costs should be supplied by the Commonwealth Railways Department to this Committee for its information.

G. H. Mackay

G. H. MACKAY,
Chairman.

Office of the Parliamentary Standing Committee on Public Works,
Federal Parliament House, Melbourne,
24th April, 1926.

MINUTES OF EVIDENCE.

(Taken at Melbourne.)

WEDNESDAY, 3RD FEBRUARY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Lynch	Mr. Lacey
Mr. Cook	Mr. McGrath.

Norris Garrett Bell, Commonwealth Railways Commissioner, sworn and examined.

1. *To the Chairman.*—The construction of a broad gauge railway from Adelaide to Port Augusta, *via* Salisbury, Long Plains, Snowtown, Red Hill, Port Germein (a distance of 190 miles) so as to provide a direct line on an easy grade in place of the existing circuitous route, *via* Terowie and Quorn, which rises to a height of 2,000 feet above sea level, as against 455 feet by the direct line, has been under consideration by the South Australian Government for the last thirteen or fourteen years. The construction of this line has been the subject of several enquiries by the South Australian Public Works Committee. The original intention was to push on with construction so as to have a 5-ft. 3-in. gauge connexion with Port Augusta by the time the Trans-Australian line was opened for traffic. The first section from Salisbury to Long Plains (47 miles from Adelaide) was, however, not completed until April, 1917. The work has since proceeded very slowly, and the section as far as Red Hill (107 miles from Adelaide) was only completed last year. In 1921 a royal commission reported on the question of adopting a uniform gauge for Australia. The Commissioners regarded the section between Port Augusta and Terowie as the most undersirable of the lines connecting the capitals, and recommended the construction of a 4-ft. 8½-in. line from Port Augusta to Lochiel, the conversion to 4 ft. 8½ in. of the 5-ft. 3-in. line to Salisbury, and that passengers should change at the latter station. When the Trans-Australian line was built it was not anticipated that it would remain for such a long period suspended between two narrow gauge sections, and it was confidently expected that long before now broad gauge connexions would have been built between Port Augusta and Adelaide, and Kalgoorlie and Perth. The presence of these narrow gauge connexions has been very detrimental to the traffic on the Trans-Australian line. After negotiations which extended over a considerable period the Commonwealth Government entered into an agreement with South Australia (as it was apparently not now the intention of that State to continue their broad gauge railway any further than Red Hill, or possibly Port Pirie) to build a 4 ft. 8½ in. gauge line from Port Augusta to Red Hill, and to lay a third rail from Red Hill to Central station at Adelaide, so as to permit of the Trans-Australian trains arriving at and departing from Adelaide. This agreement has been recently ratified by the House of Representatives, is now before the Senate, and will shortly be considered by the South Australian Parliament at a session specially called for the purpose. The length of the line which the Commonwealth will have to construct will be 83 miles, the estimated cost being £734,923. In addition, the Commonwealth will pay for the cost of laying a third rail from Red Hill to Adelaide, estimated at £380,000. The rolling-stock required is estimated to cost £104,250. The estimated working expenses from Port Augusta to Adelaide is £63,879. The annual interest charge is
estimated at £77,743, which, togethe
expenses, makes a total of £141,622.
annual revenue is £100,755, makin
annual loss of £40,867. It is consider
the construction of this line will incre
on the Port Augusta-Kalgoorlie railw
so that the nett loss, including inter
exceed £5,867 per annum from commen
on the proposed line. This small los
near future be converted into a profit.
leaving Port Augusta station, will follo
Port Augusta to Quorn line for 4¼
(a third rail being used), at which poin
due south. Livestock from the northe
detrained and watered at Stirling, an
4 ft. 8½ in. gauge trucks and conveye
abattoirs near Adelaide. From Stirlin
will be situated practically midway
of the Flinders Range and Spencer's G
Germein, and crossing the 3 ft. 6 in. ga
Crystal Brook and Port Pirie close to
country between Port Augusta and Po
what inferior, although a certain amo
grown. In addition, a number of sheep
especially on the slopes of the
Generally speaking, local traffic will
alone would not justify the constructi
practically the whole of the traffic bei
Augusta-Kalgoorlie and the Northern
leaving Port Pirie the line passes thro
country until it reaches Red Hill (27
Red Hill and a point near Port Piri
wealth will, at the expense of South
third rail to enable 5 ft. 3 in. gaug
that place. The working expenses an
new 4-ft. 8½-in. gauge section will, as
agreement, be shared by the Commo
State on a ton mileage basis. Betwee
Adelaide the State will lay a third ra
of the Commonwealth, the working
interest on the existing railway be
in the same way as in the case of the
Pirie section. Although the
sion on Uniform Gauge reported that
any mechanical device should not take
unification of the gauges—which recom
without doubt a correct one—it does
the commissioners would have condemn
third rail as now proposed. There
when unification of the gauges comes
undertaken, the third rail will require
what freely during the transition perio
use on the line under consideration is
are few station yards of any conseque
and it is only where stations with poi
and interlocking occur that any diffic
addition, under the agreement the
Railway Commissioners and myself are
depart from the third rail by laying
it is considered advisable to do so. I
with proper care and working, and
suitable points and crossings and inter
no risk will be entailed. I desire to pla
opinion that, however successful this
on the sections on which it is now pr
it, it was never intended that it cou
adopted in lieu of the unification of
anticipated that very considerable
accrue when the Trans-Australian trains
run through to Adelaide. These spec
have indicated in my report to th

Minister for Works and Railways, under date the 26th January, 1926, as required by section 59 of the *Commonwealth Railways Act* 1917-1925, and are as follow :—

1. Would reduce by about 70 miles the length of the journey between Adelaide and Port Augusta, and the time occupied from 11¼ to 6½ hours.

2. Would permit of passengers and loading being conveyed *direct* from Adelaide to Kalgoorlie (1,240 miles), obviating the delay and expense at present incurred in transhipment at Terowie and Port Augusta.

3. Would curtail by 8½ to 9½ hours the time at present occupied in the tram journey from Adelaide to Perth.

4. Would enable livestock from the Trans-Australian railway to be conveyed from point of loading to market in the same vehicle, thus affording arrival of stock in better condition. Under existing conditions, livestock for Adelaide has to be transhipped at Port Augusta into 3 ft. 6 in. trains, and again at Terowie to 5 ft. 3 in. trains.

5 Would permit of livestock being conveyed from Port Augusta to Dry Creek in ten to twelve hours. At present 25 hours elapse between the arrival of livestock at Port Augusta and time of arrival at Dry Creek.

6. Would provide a line on which on each train 85 per cent. more loading could be carried from Port Augusta and 54 per cent. to Port Augusta. (The existing line via Terowie rises at a couple of points to 2,000 feet, while on the proposed line via Red Hill the highest point would be 455 feet.)

7. Would accelerate the mail service to and from Western Australia, the outward English mail would leave Melbourne and Adelaide later, and the inwards English mail would be delivered in Adelaide on Fridays instead of Saturdays, and would arrive in sufficient time in Melbourne to enable delivery to be effected on the first round on Saturday morning instead of Monday.

8. Would be sufficiently revenue producing to at once pay working expenses and a considerable portion, if not the whole, of the interest.

9. Would permit of the quotation of a through rate to Adelaide for livestock from the Trans-Australian and the railway to Alice Springs, instead of being compelled to adopt the South Australian rates for portion of the distance.

10 Would afford, for the reasons mentioned in (2), some measure of relief from the disabilities under which the Trans-Australian railway is at present worked.

11. Would increase the revenue on the Trans-Australian railway by approximately £35,000 due to the stimulation of the through traffic which would obtain for the reasons mentioned in (2).

12. Would permit of stores and materials required for the Trans-Australian and the railway to Alice Springs being conveyed by Commonwealth trains from Adelaide, thus minimizing the expenditure at present incurred in freight charges.

With 80 lb. rails the proposed railway will be a high-class line, fully ballasted and fenced, and capable of carrying fast traffic. It will be in keeping with the existing line between Salisbury and Red Hill. There are no engineering difficulties. Under the Commonwealth Railways Act I have authority to acquire all the land necessary for the construction of a railway. Generally speaking, the land through which the line will pass is second class pastoral country. I doubt if certain areas are fenced. There is only a small acreage under wheat. The average rainfall at Port Augusta is about 10 or 11 inches a year. Probably it is a little more near Port Pirie. No serious difficulties with regard to flood waters are anticipated. At Stirling, near Port Augusta, where the proposed railway will leave the northern line, there is some possibility of flood waters, and we propose to provide for that contingency. Some trouble may be caused by drift sand, but as far as possible we are providing against it. I have been over the route. After leaving Stirling, where there are a number of small orchards, the route is through large stretches of salt bush pastoral country, with occasional patches of wheat, but the rainfall is so erratic that cultivation is rather precarious until we get in the vicinity of Port Germein. We anticipate that following the construction of this railway there will be an increase of traffic on the Trans-Australian railway. At present, owing to the difficulties in transferring goods from one gauge to another, much of this traffic goes by sea. The distance between Kalgoorlie and Adelaide will be shorter, and we shall be able to provide a more expeditious and satisfactory service. Commonwealth train crews will work Commonwealth trains between Port Augusta and Adelaide, but the station staff between Red Hill and Adelaide will be in the employ of the South Australian Government, and their salaries, as well as the maintenance of that section will be met on a ten-mile basis as provided in the agreement. With the exception of a few miles which has to be permanently pegged, the route has been surveyed. The line will traverse the country between Flinders Range and the shore of Spencer's Gulf, crossing the existing 3 ft. 6 in. railway at Solomontown, a suburb of Port Pirie, and pass about 6 miles west of Crystal Brook. Port Pirie traffic belongs to South Australia, but we shall probably get a few passengers. The original intention was to take the railway into Crystal Brook, but under the agreement the route will be, as I have stated, about five miles west of that town so as to develop the wheat-growing country there. Crystal Brook is already well served by a narrow gauge line. The intention of the uniform gauge royal commission was that the line from Lochiel to Salisbury should be converted from the 5-ft. 3-in. gauge to 4 ft. 8½ in. It is now considered advisable, however, to lay a third rail on the existing 5 ft. 3 in. railway from Red Hill to Adelaide. I feel confident that if the conditions that exist now had obtained when the royal commission investigated this subject it would have endorsed this proposal, because that body recognized that a third rail would have to be used temporarily at various points during the conversion of the existing railways to the standard gauge. Several years ago experiments were conducted at Tocumwal, New South Wales, with the third rail, and there have been numerous reports published on the subject. I have no personal knowledge of the working of mixed gauges in any other part of the world. Mr. Webb, the South Australian Railways Commissioner, is from the United States of America. He reports that large mileages of mixed gauges have been working successfully in the United States for many years. He says that, in some cases, there are as many as three gauges on the one set of sleepers. I cannot say if the experts who comprised the commission that inquired into the question of a uniform gauge had any knowledge of the working of mixed gauges in the United States. Mr. Whyte, one of the members of the commission, was a mechanical engineer. His special duty was to report on rolling-stock problems. Mr. Blake, another member of the commission, was an English civil engineer. It is possible that neither of these experts had any knowledge of the third rail being used in the United States, but Mr. Webb will be in a position to give definite information on this point. The only difficulty in working mixed gauges is at the points and in railway station yards. Where the gauges are not too close, as in the case of 3 ft. 6 in. and 5 ft. 3 in., the problem is not one to occasion much concern except in busy railway centres. It would be a comparatively simple matter to use the third rail over the section from Port Pirie to Adelaide. I am satisfied that it is a suitable arrangement to give us direct access to Adelaide without the construction of a separate railway line. The railway will not be of any assistance in the construction of the proposed line from Oodnadatta to Alice Springs, because all material required for that undertaking will be shipped to Port Augusta.

2 *To Mr Lacey* -The distance from Port Augusta to Adelaide via Terowie is 360 miles, and from Port Augusta to Adelaide over the route of this proposed line it is 190 miles, or 70 miles less From Port Pirie to Port Augusta the distance by this line will be 56 miles. I cannot say what the distance is from Port Pirie to Port Augusta via Peterborough, but, of course, it is very much greater The original intention was to make the connexion 1¼ miles out of Port Pirie, but now it is proposed to cross the line at Solomontown The country between Red Hill and the point near Port Pirie is very good I should say that, as the distance between Port Augusta and Adelaide will be considerably less than from Adelaide via Terowie, there will be a corresponding reduction in freights and fares, but this is a matter for the various railway administrations to determine As Commonwealth Railways Commissioner, I get only my mileage proportion of freights and fares over the Commonwealth line, but I shall endeavour to persuade the States to reduce the charges and thus encourage business. The Commonwealth Government will be responsible for the maintenance of the line between Red Hill and Port Augusta, and the South Australian Government will maintain the section between Red Hill and Adelaide. At present the South Australian railways authorities are working a third rail satisfactorily at Snowtown, which is a busy country railway centre. We shall not get much local traffic from the section between Red Hill and Port Augusta, but there will be considerable traffic in livestock from the northern line.

3. *To Senator Lynch.* - The estimated cost to the Commonwealth of a third rail between Red Hill and Adelaide is £380,000, and of the construction of the railway from Red Hill to Port Augusta it is £734,925, or a total of £1,115,000. All costs have increased considerably in recent years. Rails and sleepers now cost over £3,000 a mile, not including cost of laying. Sleepers which formerly could be obtained for 6s. 6d. each, now cost about 14s., and rails have gone up by about £3 a ton. We estimate that the loss in working the section from Red Hill to Port Augusta will be about £40,000 a year, but we anticipate that additional traffic on the Trans-Australian line will increase the revenue by £35,000 a year, so that the loss will be reduced to about £5,000 a year. In my opinion the agreement between the Commonwealth and the State of South Australia represents a fair adjustment of liability between the two authorities. The position of the Trans-Australian railway is improving. During the first six months of this financial year the returns have practically met working expenses. The revenue increased by about £21,000, and we anticipate a substantial increase in revenue through the construction of the Adelaide to Port Augusta section. I am aware that the royal commission which enquired into the uniform railway gauge problem decided against the adoption of a third rail or any of the mechanical devices examined by them; but, as I have said, members of the commission dealt with the third rail proposal as an alternative to the unification of the gauges, and, in principle, rejected it. They did not look at it as an expedient to overcome a difficulty such as I have indicated, namely, the construction of a separate railway from Port Augusta to Adelaide. I am hoping that in a few years we shall have a uniform gauge, when it will be possible to lift one of the rails along this section. The third rail principle could not be adopted throughout Australia, especially on lines on which there is heavy and continuous traffic, and through big railway centres On the section between Red Hill and Port Pirie there will be limited traffic and comparatively few stations, so I have not the slightest hesitation in recommending its adoption

4. *To Mr. Cook.*— With the third rail in operation there need be no occasion to adopt special speed limits. The present practice is to restrict speeds to 30 miles an hour when trains are passing through stations I have not consulted any of the engineers of my department as to the adoption of the third rail over the section between Adelaide and Port Pirie I am an engineer myself and I am satisfied that with reasonable precautions, and with the use of proper devices, we shall adopt, it will prove a satisfactory way of overcoming the difficulty of a break of gauge between Port Augusta and Adelaide Mr Hobler is a mining engineer, but I do not know if he has made a study of the third rail principle. I take full responsibility for my own recommendation to call tenders for the supply of sleepers in the north and will also invite tenders from Hobler's Broken Hill Pty. Co for the supply of Australian hardwood. No doubt we will also get a check quotation from outside Australia Generally speaking, Australian prices are £1 a ton below Australian prices. The sleepers are of excellent quality We handle 30,000 tons a year on the Trans Australian line Construction of the direct line from Port Augusta to Adelaide we expect an increase in passenger traffic on the east west route, and consider that livestock from the northern line

5 *To the Chairman* It has not yet been decided whether the line will be built under contract or by day labour Tenders were called recently for the construction of the railway from Emungalan to Darwin in the Northern Territory but I cannot say what decision will be received I have carried out the construction of several thousands of miles of railway by contract and have also built several hundreds of miles by day labour If the day labour principle is adopted for this line, we should be able to start work at once as sleepers and rails were available because of the necessary plant at Port Augusta If it is decided that the work is to be done by contract we would have to wait until the survey is completed and tenders have been accepted I estimate that I could complete the line by day labour in eighteen months The agreement with the South Australian Government stipulates that the laying of the third rail between Red Hill and Port Augusta must be completed by the time the Red Hill to Augusta section is finished

6 *To Senator Lynch* - The formula according to which the relative proportions of maintenance and interest charges to be borne by the Commonwealth and State Governments is, in my opinion equitable as between the parties The Commonwealth will be debited with the total cost as well as interest on capital involved in laying of the third rail from Red Hill to Port Augusta, but will also be responsible for capital cost of duplicating the line from Red Hill to Port Augusta The South Australian Government will have to provide for the third rail between Red Hill and Port Pirie

7 *To Mr Lacey* - We propose starting the duplication work at the Port Augusta end

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(Taken at Melbourne.)

THURSDAY, 4TH FEBRUARY.

Present :

Mr. MACKAY, Chairman,

Senator Lynch	Mr. Lacey
Mr. Cook	Mr McG

George Alexander Hobler, Chief Engineer, Works, Commonwealth Railways, Melbourne, sworn and examined.

8 *To the Chairman.*—I am responsible for the survey and construction of railways under the Commonwealth The survey work in connexion with the proposed railway from Port Augusta to Darwin was carried out by Messrs Waters, Williams I have had experience of 40 years in the location and construction of railways in the service of the Queensland Government and of the Commonwealth Government. The proposed railway starts at Port Augusta and follows the existing Port Augusta to Quorn 3 ft. 6-in. railway for a distance of 4¼ miles, at which point

off and runs in a generally south and south-easterly direction. It traverses the country lying between the western foot hills of the Flinders Range and the eastern shores of Spencer Gulf, passing Port Germein at 42 miles and crossing over the Port Pirie to Gladstone railway, 3-ft. 6-in. gauge, at 56 miles, at which point it is about 2½ miles to the east of Port Pirie. From 56 miles, which is opposite the southern end of the Flinders Range, the proposed railway continues generally in a south-easterly direction over flat and undulating country to Red Hill, which is 83 miles 16 chains from Port Augusta and the terminus of the 5-ft. 3-in. gauge railway, and 106½ miles from Adelaide via Salisbury. The country between Stirling North township, at 5¼ miles, and Port Pirie is not generally of first class quality, being of a very sandy nature, and when cleared for cultivation is inclined to drift in dry weather. The country improves as it rises on to the western slopes of the Flinders Range. Some wheat is grown on the country around Port Germein and on the country extending towards Port Pirie. A number of sheep and a few cattle are carried on the country towards the Port Augusta end of the proposed line, and also on the slopes of the Flinders Range. From the vicinity of Port Pirie the country extending towards Red Hill improves in quality for wheat-growing, being less sandy and of a much firmer nature. Very little clearing will be required for the proposed line. Where clearing has not yet been done the timber is light, and where the land has been cultivated practically no clearing will be necessary. Owing to the country being generally flat and slightly undulating throughout the principal earthworks will be light, especially cuttings of which only 94,300 cubic yards will be required. Side cutting will require the removal of 320,800 cubic yards. Very little rock will be met with in the excavation for cuttings and side cuttings throughout, and the soil to be excavated is of a very soft and sandy nature for the greater portion of the whole distance. A considerable number of shallow creeks rising in the Flinders Range and emptying in Spencer's Gulf will be crossed. These will necessitate shallow bridging of short spans (22 feet). The length of this class of bridging will be 1,628 lineal feet. At Boroota Creek (41 miles 8 chains), which has fairly deep banks, a bridge of three 40-ft. spans will be required, and at the main channel of Broughton River (67 miles 17 chains), which is both narrow and deep, a single span of 100 feet will be necessary. The proposed line will be laid with 80-lb. rails, and 1,640 cubic yards of ballast will be required to the mile. The ruling grade will be 1 in 100, and with the exception of the curve at the turn-off from Port Augusta-Quorn line at 4¼ miles (where the radius of curve is 24 chains) the sharpest curve will be 40 chains radius. Broken-stone ballast for the line can be obtained from the adjacent foot hills of the Flinders Range at several places between Port Augusta and the 50 miles. A third rail for a 5-ft. 3-in gauge will be laid from opposite Port Pirie to Red Hill, a distance of 27 miles. The estimated cost of constructing the proposed line is £734,923. The principal items which make up this total are:—

Clearing, grubbing, fencing, &c.	...	£28,430
Earthworks	...	£98,330
Bridges and minor water-ways ...	...	£71,660
Permanent way (including permanent-way material	..	£442,012
Telegraph line	...	£10,530
Traffic and locomotive accommodation, signalling, &c.	...	£40,000
Locomotive water supply ...	...	£7,000
Housing accommodation for employees ...		£11,000
Equipment for maintenance gangs ...		£975
Maintenance for six months after construction	...	£4,980
Land resumption and surveys, including railway surveys	...	£20,000
A total of	..	£734,923

The total average cost per mile is £8,833. There are two sections of third rail construction for which estimates have been prepared, one from Adelaide to Red Hill which is estimated to cost £380,000 and one from Red Hill to Port Pirie estimated to cost £37,000. The distance of the former is 106½ miles and the latter 27 miles. The section of third rail to be laid between Red Hill and Port Pirie is to be undertaken by the Commonwealth at the expense of the South Australian Government, and for that reason the cost has not been included in our estimates. The bridges throughout will be of steel superstructure on concrete substructures. The 22-ft. span will be built on concrete piers with steel joists and the 40-ft. and the 100-ft. spans on concrete piers with steel plate girders. These particulars relate to the two large bridges. The 1,628 feet of bridging mentioned covers the shallow bridging required at various creeks, and in addition to this there will be ordinary culverts and concrete box drains which are included in our estimates under "minor water-ways." The £11,000 mentioned for housing employees is for constructing permanent buildings for railway fettlers, for which no drawings have yet been prepared. We have had to prepare an estimate of the cost. We shall design a house suitable for the climate and situation. We can hardly tell the exact number of houses until we know the number of men in each gang and the location of the gangs. The houses will probably be of timber. The sleepers on the line from Port Augusta to Port Pirie will be 8 feet by 9 inches by 4½ inches, and from Port Pirie to Red Hill 8 ft. 6 in. by 9 inches by 4½ inches; the increased length of the sleeper on the line from Port Pirie to Red Hill is to provide for laying the third rail on the 5-ft. 3-in. gauge over that section. Consideration has not been given to the use of concrete sleepers for this work. We are watching the question of concrete sleepers closely, but at present we have no information to warrant the adoption of concrete sleepers on a job such as this. It is possible that we shall be able to experiment with concrete sleepers as the work proceeds, but as a general rule it is better to conduct experiments on open lines when sleepers are being renewed. It is somewhat difficult to say how the costs compare, as we have not had an opportunity to call for large quantities of concrete sleepers, and, therefore, cannot thoroughly ascertain their actual market value. As a rule, concrete sleepers are more expensive than wooden ones; but when they have reached that stage where they can be adopted for railway work there is no doubt that it will be found that the life of a concrete sleeper is much longer than that of a wooden sleeper. Experiments were made with concrete sleepers in the Northern Territory some years ago, but they were not a success. We have drawings of concrete sleepers upon which it is probable that experiments will be conducted. The estimated cost of the sleepers to be used on the Port Augusta to Red Hill line is 11s. 6d., each delivered in dépôt at Port Augusta. That price is based on the cost of powellized jarrah sleepers from Western Australia. When large supplies are required we call for tenders in the various States. All sleeper timber has a varying value. Ironbark is one of the best types, but in white-ant country it is subject to attack in some instances by these pests more so than in the case of other timbers. We have a record of the life of timber sleepers on open lines. We study the experience gained in other States. The addition of a third rail will make practically no difference to the life of the sleepers. When I was in America recently I did not see the third rail in use there, although I understand that it is working in several places. As a rule, it is not used where the traffic is exceptionally heavy. Where two different gauges meet in station yards a third rail if often used. There is a third rail in the shunting yards at Port Augusta. The use of the third rail in shunting yards does not entail the same risk as on a main line. Between Red Hill and Port Augusta some of the land

is leasehold, and some freehold. The book of reference shows only the area to be resumed for the railway and not the area of the blocks. It is not a country of big areas. I should think that the holdings would average about 500 acres. The low cost of £20,000 for land resumption is explained by the fact that a lot of the land is unalienated and unoccupied. None of the land is of a very high value. I made the estimate of the cost of resumptions. All the land between reference numbers 52 and 95 inclusive is Crown land. That explains why the line runs away from the road. The statement by a previous witness that the adoption of the proposal would provide a line on which 85 per cent more loading could be carried from Port Augusta and 54 per cent. more loading to Port Augusta, was a comparison with the existing line via Terowie. On the proposed line the grade is much flatter, so that there will be a very great saving in haulage. Goods carried from Adelaide to Port Augusta via Terowie have to be lifted 2,000 feet, whereas on the proposed Red Hill line the highest point is only 455 feet. That will make a considerable difference in the haulage of goods, because on the flat country the ruling grade will be 1 in 100, whereas on the line via Terowie it is about 1 in 60.

9. *To Senator Lynch.*—The department is concerned only with the route from Port Augusta to Red Hill, because from Red Hill to Adelaide a line is already built. A proposed line from Port Augusta via Horrocks's Pass to Wilmington has been carefully examined and reported on. A trial survey has disclosed that the earthworks would be very heavy, and that steep gradients would be necessary. The line would have to be taken right up to Wilmington, which is a considerable height above sea level. It would have to climb the Flinders Range on one side, and descend on the other side, and it would have to descend from Wilmington to Adelaide. It would also cover a longer distance than via Red Hill. The route via Red Hill is the best and most economical. The country from Port Augusta to Port Pirie is very sandy up to the foothills of the Flinders Range, but as one commences to rise on to the foothills it improves. The construction of the line would promote such settlement as the quality of the soil warrants. Before the slopes get too steep the country is suitable for cultivation and grazing, and a number of the steeper slopes are used for grazing. The rainfall is approximately 9 to 10 inches on the western side of the range, and along the route of the railway, and 21 inches on the eastern slopes of the range. The construction of the line will stimulate settlement towards the Port Augusta end. From Port Germein to Port Pirie the country is already fairly well settled. The line will be built to the best standard, and, with a proper class of express engine, will permit of a maximum speed of 60 miles an hour. With the class of locomotive used for mixed traffic a maximum speed of 45 miles an hour will be obtainable. The estimated cost of £8,800 a mile could be reduced by constructing an inferior type of road, but that would not be advisable. We have to provide for carrying a certain axle-load engine, such as we already have. A certain weight of rail has to be laid to carry those engines. The sleepers will all be of timber. Most of the sleepers that we have had to renew on the transcontinental line were Tasmanian stringy bark, which has not been a success. The powellized kauri and jarrah sleepers have been standing fairly well so far. The powellized sleeper is very satisfactory, as far as our experiments have gone, in the dry belts. We tried powellized kauri sleepers on the Darwin railway, where the rainfall is heavy, but there they were not a success. On the transcontinental line, where the rainfall is not more than 7 or 8 inches a year, they have, so far, been very successful. Tenders for sleepers for the proposed line will be called in all the States, and we shall select the sleepers that are most reasonable in price and likely to give the best return and service.

(Taken at Melbourne.)

FRIDAY, 5TH FEBRUARY.

Present.

Mr MACKAY, Chairman.

Senator Lynch	Mr Lac
Mr. Cook	Mr Mc

George Alexander Hobler, Engineer Works, Commonwealth Railways, further examined.

10. *To Mr McGrath.*—The railway no Port Augusta from Adelaide to Quorn State. The State train meets the Comm at Port Augusta and conveys passeng Augusta over a 3-ft 6-in gauge railwa where a transfer is made to the 5-ft 3- which runs to Adelaide. I am satisfie ticability of a third rail in special circum only difficulty is where you enter Statio Port Pirie to Adelaide on the new line around any station yards with complica crossings. At Adelaide we shall break mixed gauge, and run to our platform 8½-in. gauge. Thus we shall avoid m crossings in that busy yard. If the 5 were continued from Red Hill to Port monwealth trains could not run over sengers for Adelaide would still have to Augusta. By running a 4 ft 8½ in gau and having a third rail from that point we shall avoid this transfer at Port Au carry our passengers straight to Adelaide between Adelaide and Port Augusta w by about five hours. It is for the C Railways and the Commonwealth Gover whether this line is to be built by labour. The estimate I am preparing both methods of construction. This lin opening up country, particularly betwe mein and Port Augusta. In resuming land which has been resumed for railw consideration is paid to the value ad by the proposed construction of a railw the proposed line is Crown land, whi occupied.

11. *To Mr. Lucas.*—The Crown land is between Port Augusta and Port G anything, is nearer to Port Augusta Germein. There is very little differenc of the land between these two places. Pirie and towards Red Hill there is a ment, and the country is more settled. line nothing would be gained by comme at Port Pirie as well as Port Augusta own wharf at Port Augusta, whereas should have to pay wharfage charges. the material will therefore be landed The people of Port Pirie have asked the go nearer to their town than the rou the Commonwealth Commissioner of Ra State Commissioner. But to do so woul its length. We have already bent straight line near Port Pirie, and if we ther to the west we should have conside taking it out again to the north. The to the north of the town. The cost of would also be increased the nearer we of the town. In any case, there would in taking the 4-ft. 8½-in. gauge line Pirie, because the town will be served gauge line from Adelaide. If we too gauge into the town we should have to means to take it through the station ya of resuming land would not be incre reasonable way out to the north could would still be an objection to

wishes of the people of Port Pirie, as to do so would increase the length and consequently the cost of the line. It would not be difficult to get out to the south, and the route could be along a road to the south as suggested by the residents, thus avoiding the cost of resuming valuable land, but that would mean bending the line again to the east to avoid the swamps and creeks to the north of the town, which would mean again increasing the length and consequently the cost of the line. A 4-ft. 8½-in. gauge railway would not draw much traffic from Port Pirie to Adelaide, and the little we would be likely to get from Port Pirie to Port Augusta would not be sufficient to warrant the extra cost, small as it might be, of going into the town. We shall have some trouble in the sandy country between Port Pirie and midway between Port Germein and Port Augusta, but only the usual sand trouble that occurs wherever a railway passes through sandy country. The matter of running the line a little further to the west, hugging the swampy country, has been considered, but it would mean the resumption of more valuable land, and an increase in the length and cost of the line for very little advantage. It would mean more earthworks and deeper bridges. Hitherto we have not used any South Australian indigenous timber for sleepers, but I believe it has been used by the South Australian Railways. There is not much of it. If there is any local timber of use for our purposes we shall certainly use it, but I do not think we can get very many sleepers from that source. The third rail is now in use on the wharf at Port Augusta, but only for slow goods traffic. It is not used by passenger trains, and therefore our experience on that wharf cannot be used as a guide for what will happen on the new line, which will be traversed by fast passenger trains. The State railway to Wilmington, which might have been extended to Port Augusta, is a 3-ft. 6-in. line suitable for light rolling-stock only. It would be absolutely useless for our purposes.

12. *Mr. Cook.*—Settlers can get water in wells along the route of the line, but it is a rather hard water, not too suitable for domestic purposes. For that reason large reservoirs have been built in the Flinders Range, and the water is gravitated through pipes to the different farms. The country on the eastern side of the Flinders Range is already well served by railways. It is good country, principally used for fruit and wheat. On the east-west line we find the powellized kauri sleeper standing best. We are watching very carefully experiments with concrete sleepers. These experiments are being conducted by Victoria, South Australia, and New South Wales. White ants should not be bad between Red Hill and Port Augusta. Tenders for sleepers will be called in all the States. There will not be a sufficient supply available in South Australia. The line will pass about 23 miles from Port Pirie, which has a population of about 8,000, varying according to the amount of smelting in progress. The State department will run a 5-ft. 3-in. gauge line into Port Pirie, and handle all the traffic to Adelaide. The only passengers we might get would be a few going north to Port Augusta. Even if we did take our line closer to the town, it could not go right in because of the swamps and creeks to the north. The lay of the country will not permit us to go into the town without coming out again a long distance to get to the north. There would not be sufficient traffic to justify that additional cost of construction. Notwithstanding the report of the Royal Commission on the use of a third rail, I feel that our decision to use it in this instance will be quite safe. It will only be a temporary proposition until the unification of our gauges is completed. The third rail from Port Pirie to Adelaide will form part of the work that will have to be done when that unification is brought about. It is a different proposition from that of providing a third rail between Albury and Melbourne. The line between those two places passes through many large towns with complicated railway yards, and carries considerably more traffic than there will be between Port Pirie and Adelaide. No advantage would be gained by using a third rail between Melbourne and Albury, because it would not lead to a saving in rolling-stock. On the other hand, it would mean an increase in rolling-stock, which would be useless when unification came about. Unification will decrease the amount of rolling-stock required for the working of Australian railways. I do not know off-hand what saving will be effected by having a third rail between Red Hill and Adelaide.

13. *To the Chairman.*—I am unable to say who made the suggestion for the use of a third rail between Red Hill and Adelaide. The matter was arranged between the Commonwealth Commissioner of Railways and the State Commissioner. A third rail is a practical proposition where the special circumstances warrant it. It is useful in station yards where two gauges junction. But where a line runs through complicated station yards, it is best to run around them, as we shall do between Adelaide and Red Hill. The estimate given for the cost of building the line includes provision for running around these yards. We make the third-rail method safe in this way. The Royal Commission which investigated the third-rail proposition and decided that any time or money spent in having a third rail or mechanical devices to overcome the break of gauge would be wasted, was, I understand, speaking of the general use of a third rail in an effort to bring about the conjoint running of rolling-stock among the different State systems. I do not think that the commission would have any objection to the use of a third rail from Port Pirie to Adelaide, seeing that when it is laid it becomes the forerunner of complete unification later on. When unification comes about we shall simply take up one rail where the gauges are mixed between station yards, as is proposed in this case and in the station yards themselves the wider gauge rail will be lifted and the third rail put down, while the points and crossings will be adjusted to the new gauge. The proposal is not to run around a small station with, say, only one siding and no complicated points system. In such cases our cars will be able to draw up to the platforms. The rails, sleepers, and ballast on the section between Port Augusta and Red Hill will be the same as those used on the east-west line. There should be about five or six stations on that section. These stations will not have raised platforms. Our trains do not require high level platforms. There will be no surface water available for locomotives, but we shall get from the reservoirs in the Flinders Range all we require for them. The water from those reservoirs will not affect the boilers. In parts where the original timber remains, care will be exercised in clearing it to leave as little opportunity as possible for sand-drift. We can do nothing in this direction in the cultivated area, but there the crops which are grown for the greater part of the year help to prevent the sand from drifting. The railway from Crystal Brook to Port Pirie is on the 3-ft. 6 in gauge. When I mentioned that there would be a 5-ft. 3-in gauge railway running into Port Pirie, I meant that a third rail would be laid down from our 4-ft. 8½-in gauge line into Port Pirie. We shall put down a third rail between Red Hill and the point at which we pass Port Pirie. The third rail will enable our line to carry rolling-stock of 5-ft. 3-in. gauge. The South Australian Department will then connect our line with Port Pirie by a 5-ft 3-in. gauge line, and the broad-gauge South Australian rolling-stock will run from Port Pirie along our line to Red Hill, and thence to Adelaide. There will really be three gauges at and past Port Pirie—our 4-ft. 8½-in. gauge, and the State 5-ft. 3-in., and 3-ft. 6-in. gauges.

14. *To Senator Lynch.*—The provisions of the agreement with South Australia affecting the construction of the line are all right from my point of view. The provisions in regard to traffic are a matter for the Commissioner. At Kalgoorlie our 4-ft. 8½-in. gauge line crosses the State 3-ft. 6-in. gauge, but in the Kalgoorlie station yard there is no mixed gauge. We run to our own platform clear of the other gauges. At Adelaide we shall leave the mixed gauge close to the station yard, and follow our own course to the platform where we shall discharge our passengers. The State Commissioner intends to spend a large sum of money in installing signals between Adelaide and Red Hill.

(*Taken at Melbourne.*)

WEDNESDAY, 10th February, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Lynch	Mr. Lacey
Mr. Cook	Mr. McGrath
Mr. Gregory	Mr. Seabrook.

William Langridge Artlett, Chief Traffic Manager and Comptroller of Stores, Commonwealth Railways, Port Augusta, sworn and examined.

15. *To the Chairman.*—I am aware of the proposal to extend the transcontinental railway from Port Augusta to Red Hill, and to lay a third rail to give a 4-ft. 8½-in. gauge from Red Hill to Adelaide. I prepared the estimates of revenue and the working costs of the traffic branch of this line, and also the estimate of the additional rolling stock. There are certain sources of revenue which will present themselves when the line is built. They are to be divided into three headings—passenger and coaching traffic, goods traffic, and live-stock traffic. I first of all set out to estimate the likely volume of traffic over the new line, and having decided that, then I ascertained what was a fair allocation of the earnings to the proposed line from Port Augusta to Adelaide. That line will be allowed to cater for the traffic between Port Augusta and Port Pirie. It will be able to compete with all traffic from Adelaide to any point beyond Port Pirie so far as goods traffic is concerned, and will be able to carry passenger and parcel traffic from Adelaide to any point served by it outside Adelaide. For instance, the new line will be entitled to cater for all traffic from the Oodnadatta line. I consider that the revenue to be credited to the new line will be derived from three sources: first, the through traffic between Western Australian stations and those on the transcontinental railway, and the railway stations of eastern States, namely, South Australia, Victoria, New South Wales, and Queensland; secondly, traffic between stations on the Oodnadatta line, including Port Augusta and South Australian railway stations; and, thirdly, the new traffic that will originate on the line itself. I shall deal with passenger traffic first. In forming an estimate of the passengers likely to travel, one must work purely on conjectural grounds based on experience. It is not a matter upon which one can lay down any definite statistical basis. The increase in the through passenger traffic from the financial year ending the 30th June, 1922, to the financial year ending the 30th June, 1924, was 8 per cent. I consider that the increase in our passenger traffic under existing conditions for the two succeeding years will be quite as great. Then I allow for the traffic which will be created by the new line. It will cut out two breaks of gauge, one at Terowie and one at Port Augusta, which are undoubtedly a great detriment to passenger traffic. Many persons prefer to travel by steamer simply because of the inconvenience of the breaks of gauge. The new line will save approximately nine hours in the journey between Adelaide and Kalgoorlie or Perth; but, of course, that saving in the journey is subject to agreement between the States affected. When the line is built the time table will need alteration in consultation with the States. I anticipate an increase of traffic by the 30th June, 1926, of 25 per cent. compared to what it was in 1924. That allows 8 per cent. for natural growth of traffic, and 17 per cent. for added facilities on are dividing interstate railway fares consequently the new line will get cr of additional traffic. I worked out basis, and came to the conclusion could be credited with £33,800 Oodnadatta line passenger traffic on were available of the traffic annually Oodnadatta line to and from statio Creek, which is about ten miles from did not take credit for traffic originat Creek and coming from the Oodnada north of Dry Creek. After making a considerable number of passengers reason or other would still travel vi owing to local interests, I credite £13,430. The local traffic I put dow is traffic which originates and termi posed line from Adelaide to Port and mail traffic is comparatively small line with £10,000 for both these traffic three headings. I credited the line the increase in the goods traffic owing vice, with £13,000 for the Oodnad and with £1,000 for local traffic. the line with £24,300 for live-stock the three sources named. Those together give an estimated revenue will be necessary to increase the sta Augusta and Adelaide, as there will additional line to work. We will run guards, and firemen right through to not estimate the cost of rolling-stock, the requirements. We shall want three with first and second class accommodati subdivided into smoking and non-sm ments, three rail motors, with five cattle wagons, and four bogie goods existing engines will be sufficient for not expect any increase in the numl trains in consequence of the building I expect that we shall have to strengt trains by one additional coach. I ha experience of railways. Years ago I the third rail system at Port Augus junction of the 3-ft. 6-in. gauge with gauge. That system has also been use way stations, e.g., at the junction of gauge with the 5-ft. 3-in. gauge, but I the third rail used for a long stretch present, Port Pirie is connected with 3-ft. 6-in. gauge, and it is a rather nexion. No doubt South Australia direct connexion with Port Pirie on gauge, and I imagine that advantage South Australia in agreeing to this pr

16. *To Mr. Gregory.*—The increase traffic on the new line owing to bett the saving of time in the journey wo ing for rail fares, sleeping berths, saleable commodities, £33,800. The rolling stock on the estimates prepar Mechanical Engineer is £104,260. W while the revenue will be £100,755 fo after the line is opened, the estima penses and annual interest charges £141,762. I do not think that we traffic in the district served by this li under the agreement, carry goods b and Port Pirie and intermediate st can carry them from Adelaide t north of Port Pirie. We can and parcel traffic between Adelaide an beyond. The construction of this line w carriage of commodities from the ea Western Australia. It will save tran and Port Augusta. I anticipate that tional traffic created by this line we sha of £35,000 on the line from Port Aug

It will increase the number of passengers on the transcontinental railway. I estimate that in the first year we shall lose £6,000, after paying working expenses and interest, allowing for no sinking fund. I have had no experience of the running of the third rail over any long stretch of railway. I am an operating railway man, and I know what the system involves. Personally, I see no difficulty whatever in operating the third rail on the line from Red Hill to Adelaide. It could not possibly be operated in large station yards, in which shunting operations are carried out The gauge from Adelaide to Red Hill is 5 ft. 3 in., the weight of rails being 80 lb. Of course, over points and crossings we always reduce speed. We do not anticipate any difficulty or danger in working that line, because there will be a deviation past some of the larger railway stations. If I had charge of the line I should have no hesitation in operating it. I know that in the Old Country the uniform gauge was substituted for the third rail. I believe that trials were made on the border between Victoria and New South Wales with the Brennan switch, but that is not the same principle as we now propose to adopt. I was not present at the test of the Brennan switch. Railway engineers are not enamoured of the idea of the third rail, because it generally leads to confusion. One of the ideas of the uniform gauge was the interchange of rolling-stock, which is not possible with a third rail. I had twenty years' experience in the New South Wales railways, and I know that the running of a third rail through a congested railway yard would simply lead to disaster. The present proposal is a different proposition altogether, and I am quite prepared to recommend it.

17. *To Mr. Cook.*—The estimate of £24,300 is for both store and fat stock, but mainly fat stock, because the bulk of it goes to the Dry Creek sheep and cattle markets. It comes from various points on the East-West line and the Oodnadatta line. The estimate is based on the actual stock traffic, and I consider it a close figure. The estimate of £10,000 for parcels and mails is also based on actual traffic. There was one item of £525 for certain mail traffic carried under certain conditions. In this estimate I have put that item down at £625. In other cases we have reduced the rates by 15 per cent., because we will charge a through rate, instead of two local rates. The estimate of 25 per cent. increased traffic is a purely personal one based on my intimate knowledge of the traffic that we are carrying, and on the evidence of several experts that I have met. It is impossible to get an exact basis for that estimate; it must be formed on one's judgment.

18. *To Mr. Seabrook.*—Coming south from Port Augusta the line will run through sheep country, and after passing Port Pirie will run through wheat country. I do not anticipate that we shall get much wheat traffic on this line, and I have made my estimate on that basis. There is very little traffic in cattle, because the cattle in that district comprises either working beasts or cows. By the construction of this line the time of the journey on the transcontinental line will be reduced by nine hours. It will undoubtedly be a drawback to the line to Terowie, because traffic will be diverted from it. It is a big thing to reduce the journey by nine hours. The stock will be carried 70 miles less than at present, and at lower freights. Stock coming from the Oodnadatta line will be carried 27 miles less than at present, and at lower freights. The public will also get the benefit of the shorter journey. We are not allowed, under the agreement, to carry goods between Port Pirie and Red Hill.

19. *To Mr. McGrath.*—The through traffic on the east-west line is undoubtedly a big consideration in this proposal. It will benefit the person whose land it runs through, but that has not been taken into consideration at all. We do not carry many goods from Victoria. We carry over the east-west line all potatoes that are used in Kalgoorlie and surrounding districts during six months of the year. We sometimes carry potatoes to Perth. They come from Ballarat and Bungaree, and other places, and are carried at a cheap rate. When this line is constructed the potato freight will not be reduced, because it is a very reasonable rate. In any case, the potato-grower will send his produce to Perth by boat so long as one is available, but it is cheaper to send potatoes to Kalgoorlie by rail. In my opinion, the Commonwealth is getting a very fair deal from the construction of this line. The freight that we lose from Port Pirie to Adelaide will be compensated for by the traffic we take from the Terowie line.

20. *To Mr. Lacey.*—This line will be able to take goods from Adelaide to beyond Port Pirie. In order to popularize the transcontinental railway the Commissioner has on several occasions asked the Victorian Railways Department to provide second class sleeping berths on the line from Melbourne to Adelaide. It has for several years been placed for discussion on the agenda paper of the annual conference of railways commissioners, but the Victorian Department will not agree to the suggestion owing to the heavy cars and the additional time which it says will be involved. As there are second class sleeping berths on the transcontinental railway, the adoption of the same system by Victoria on the line from Melbourne to Adelaide would undoubtedly be of great assistance to us. We intend to run rail motors and trailers on this line. On express days we shall put on a local coach for traffic as far as Port Augusta, and on other than express days my idea is to work the traffic by a rail motor. We shall have three express days a week, and four rail motor days. It is proposed to attach a covered van to each rail motor in order to give a regular goods service. When this line is built cattle from the north will transfer at Stirling North, instead of continuing on the 3-ft. 6-in. gauge to transfer at Terowie. I expect that Stirling North will develop into an important centre. The time that the cattle are spelled will depend upon the haulage. I have based my estimate of the stock traffic on the existing traffic, and not upon any development owing to the Alice Springs line. That line, when constructed, is likely to increase the traffic on the proposed line. It is quite likely that all wheat grown in the area between Port Pirie and half way to Wallaroo will be carried on this line. I do not think it would be worth while, just to pick up a small amount of passenger traffic, to divert the line to the west into Port Pirie instead of running it as is now proposed close to Solomontown railway yards.

21. *To Senator Lynch.*—The Commonwealth Railways Commissioner will have control of the freights and fares charged on that portion of the line between Port Augusta and Red Hill. The only restriction is that he must not charge less for goods from Adelaide to a point north of Port Pirie than the State charges from Adelaide to Port Pirie, and he must not charge less for the conveyance of passengers and parcels between Adelaide and Port Pirie than the State does. That restriction is covered by the agreement. On the stretch of line from Port Augusta to Port Pirie the Commonwealth Commissioner is free to charge what he pleases. We consider that the carriage of cattle from the north-west will be a considerable item in our receipts. I, personally, do not favour cattle trains which permit cattle to walk right through, as they do in the Argentine, because the cattle are knocked about more than if they were carried in single or partitioned trucks. It is anticipated that as a result of the construction of this line the revenue of the transcontinental railway will be increased by £35,000 a year, and that after paying working expenses and interest upon the capital expended, there will, for the first year, be a loss on the line from Port Augusta to Adelaide of about £6,000. But for the estimated increase of £35,000 on the transcontinental line, the proposed line would show a loss of £41,000.

22. *To Mr. Lacey.*—We have recently installed larger cattle trucks on the North-South railway, but there is some objection to them because there are no partitions in them.

(Taken at Adelaide.)

SATURDAY, 13TH FEBRUARY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Lynch	Mr. McGrath
Mr. Cook	Mr. Seabrook.

William A. Webb, Chief Commissioner, South Australian Railways, sworn and examined.

23. *To the Chairman.*—Prior to my appointment I was chief executive officer on various railways systems in the United States of America for about 20 years. The agreement relating to the construction by the Commonwealth Government of the proposed line between Red Hill and Port Augusta was handled by the Government of South Australia. It is not an agreement made by me with the Commonwealth Railways Commissioner, but I was consulted. My approval was sought concerning the general terms of the agreement, but not specifically as to its details. Generally speaking, it meets with my approval, although I do not think that South Australia will gain very much from it. That State will have the advantage of the third rail connexion between Red Hill and Port Pirie, and it is giving the Commonwealth Government a very valuable concession by allowing it to bring its railway line through the heart of the best area in the State and into the Adelaide railway station yard. The users of the Commonwealth railway will gain very much by this concession. If the line to Alice Springs is built naturally all trade from the north line will pass over the projected railway between Red Hill and Port Augusta. I cannot say definitely if under the agreement the Commonwealth will be entitled to railway traffic from any point north of Port Pirie, because I have not read the final draft of the document. I know the route of the proposed railway. Generally speaking, the country to be traversed by the line is good. Certainly between Red Hill and Port Pirie it is good, but I cannot speak so definitely of the land between Port Pirie and Port Augusta. We are chiefly concerned in the proposal to lay the third rail from Red Hill to Port Pirie. Wheat is the principal product in that area. I cannot give any information concerning the operation of the betterment principle as applied to railway construction because this is entirely in the province of the Crown Lands Department. I do not know who was responsible for the location of the proposed line. I had nothing to do with it. I have never been over it with a view to its location, and therefore I can only express an opinion from an examination of the map. No officer of my Department has been consulted concerning the route except in regard to a proposal to bring the 4-ft. 8-in. line nearer Port Pirie. I cannot see how this will be of any advantage, because we shall have the 5-ft. 3-in. connexion by means of the third rail, and it will serve all the lines which we propose to convert from the 3-ft. 6-in. gauge to our standard of 5 ft. 3 in. I have suggested several times that the 5-ft. 3-in. gauge should be extended to Quorn, and that the Commonwealth railway should be linked up with our broad gauge system at that point. Whether that proposal would be better than this scheme is a question of finance entirely, but I should say that, quite apart from the construction of the line connecting Red Hill with Port Augusta, it will pay South Australia eventually to extend its broad gauge system to Quorn. I do not know what is the position with regard to water for railway purposes north of Port Pirie. We have no trouble south of that point. For railway construction in this State we use 8 ft. 6 in. x 10 in. x 5 in. redgum sleepers when we can get them, and, of course, jarrah from Western Australia. There would be no difficulty in fixing the third rail to that type of sleeper. I do not know who was responsible for the proposal to lay the third rail. Its advantage lies in the fact that, in this case, it will mean a saving in cost of construction. I have read the report of the experts who inquired into the unification of gauges in 1921, and I am aware that they condemned the third rail proposal, but think they had in mind the general principle, and therefore were against any mechanical device being employed as a substitute for the unification of the gauges. Practical experience has demonstrated that the third rail may be used with safety in certain circumstances. I know nothing of the experience with the third rail in the other States, but I was associated with a Colorado railway in the United States of America for 20 years, and I know we had no difficulty with mixed gauges in that system. They proved to be entirely practical and safe, and presented no complications. Denver City, which is a larger railway centre than any city in Australia, has mixed gauges. We found it practicable to do all our railway work with mixed gauges there. I have no knowledge of the working of the third rail in the Argentine. Until about six months ago we worked the third rail at Wolseley in this State, and we have a few short tracks at Hamley Bridge as well as at Snowtown. The ruling grade between Adelaide and Red Hill is 1 in 100, and the maximum curves are 25 chains radius. With 80-lb. rails on this section we get an average speed of 26 miles an hour. This speed could be increased with larger locomotives. There would be no necessity to limit the speed on the third rail. There are 21 station yards, and in addition three passenger stopping places between Adelaide and Red Hill. The third rail would offer no complications in station yards. When first we discussed the third rail proposal between Red Hill and Adelaide we thought it might be necessary, in order to avoid complications, to run around certain stations, but we are now in a position to say positively that there will be no additional risk and no mechanical difficulties by running through the stations. From Adelaide to Red Hill we shall be responsible for all signals and telegraphing between stations. There will be no need to alter the present automatic system. Up to the present we have only prepared a rough estimate of the cost of the third rail between Red Hill and Adelaide. I presume that when we prepare our detailed specification of costs it will be submitted to the Commonwealth Government, not necessarily for its approval, because we shall determine the standard of work required South Australia will pay for the laying of the third rail between Red Hill and Port Pirie, and the Commonwealth will pay for the third rail between Red Hill and Adelaide, but the South Australian Railways Department will lay the latter. The proposed line may take some live stock revenue, and, perhaps, a little passenger business from the State railway system. The Commonwealth and State will have joint use of the permanent way, station yards, and buildings, and although there may be differences of opinion, and, perhaps, occasionally family quarrels, we do not expect that serious friction will result from the arrangement. Our rough estimate of the cost of the third rail between Red Hill and Adelaide is £450,000 as against the Commonwealth estimate of £380,000. Our estimate includes electric signalling. I cannot say if this provision is included in the estimates submitted by the Commonwealth Railways Commissioner. I do not think that there would be any danger of congestion or any increase in risk in the Adelaide station yard. I assume that each railway authority will be responsible for the actions of its servants in the event of any untoward happening.

24. *To Mr. McGrath.*—We do not propose to bring the third rail into the main Adelaide station. We are providing a separate track in the station yard for the 4-in. 8½-in. line. It will, of course, cross certain points of the main system, but we shall not have the mixed gauge in all the tracks. We shall have one track, or possibly two, to handle the Commonwealth business.

There is no conflict of opinion between the Common wealth and State people as to the location of the 4-ft. 8½-in. gauge in the Adelaide station. The construction of the line from Red Hill to Port Augusta will, of course, mean a considerable saving of time on the through journey from Kalgoorlie. It will be possible to maintain the average speed of the transcontinental train over the new section and over the third rail to Adelaide.

25. *To Mr. Lacey.* — Undoubtedly South Australia will benefit by the laying of the third rail on the section between Red Hill and Port Pirie, and I have no doubt that people living north of Port Pirie will benefit, but I doubt if the Commonwealth would be justified in undertaking the expenditure for the additional traffic that may be developed there. That, I take it, is not the main consideration. We are only able to get small supplies of South Australian timber for sleepers. Where the gauges are mixed there is a slight technical difference in the details at points and crossings.

26. *To Mr. Cook.*—Our estimate of cost for the third rail between Red Hill and Adelaide works out at about £4,000 a mile. With 80-lb. rails there is a space of 3? inches between 4-ft. 8½-in. and 5-ft. 3-in. line; with 100-lb. rails this space is reduced to 3¼ inches. We do not anticipate any difficulty in working all points and crossings on these gauges. I do not think that the mixing of the 5 ft. 3-in. and 3 ft. 6 in. gauges would be safer in working than the mixing of the 4 ft. 8½ in. and 5 ft. 3 in. We experience some difficulty with white ants over certain section of our line We have tried steel sleepers, but they are not satisfactory in any system with automatic signalling Concrete sleepers have also been tried, but as yet they are in the experimental stage. In construction work we find we can do better with our own gangs than by contract, because we are better organized than any private contractor can be, we have a better plant, and can command the services of better men

27. *To Senator Lynch.* — I am not acquainted with the country east of the Flinders Range and north of Port Pirie. Obviously the route will mean a shorter through journey from Kalgoorlie to Adelaide, but I can offer no opinion as to the best location of the route. I am not prepared to say if the construction of the line is likely to be mutually advantageous to the Commonwealth and the State That hardly comes within my province. I think, however, that the Commonwealth will reap some advantage from traffic off the northern line. From what I know of the country, I doubt if there will be any development of the traffic north of Port Pirie as far as Port Augusta. In Colorado we had a large mileage of two mixed gauges and over a small mileage we worked even three gauges on one set of sleepers, namely—2 ft., 3 ft., and 4 ft. 8½ in. lines. In some cases we had three gauges in station yards. They were all worked without additional risk, but necessarily they were more expensive to maintain. I regard the third rail as an expedient to meet such problems as we have in Australia, but every case should be considered on its merits. I should have no hesitation in recommending the third rail in certain circumstances, because I know from experience that it does not mean additional risk. There is not likely to be any difficulty between the Commonwealth and South Australia as the result of this agreement, because the jurisdiction of each authority is clearly defined.

28. *To Mr. Seabrook.*—Though I did not handle the agreement between the Commonwealth Government and the Government of South Australia, I was properly consulted as to certain features of it. I believe that the Commonwealth, rather than the State, will benefit from the construction of this proposed line. The Commonwealth, under the agreement, will not be permitted to handle local freight between Port Pirie and Adelaide, but may cater for freight north of Port Pirie. I have had long experience in the treatment of sleepers, and I find that if we can be assured of sufficient supplies of jarrah at a reasonable cost, treatment does not pay. Our estimate of £450,000 for the third rail to Adelaide does not include Commonwealth rolling-stock.

29. *To Senator Barnes.*—I do not think that the construction of the line will lead to any substantial development of traffic along the route We can handle all the traffic on existing lines. Ultimately we propose to extend the broad gauge system from Terowie to Quorn. I cannot see how nine hours will be saved in the journey from Kalgoorlie to Adelaide, because this line will *mean a saving of only 66 miles.* I estimate the saving in time will be about five hours, but I have no doubt that Mr Bell had good reason for his estimate.

30. *To the Chairman.*—The difference between our estimate of £450,000 and that submitted by the Commonwealth Railways Commissioner of £380,000 for the laying of the third rail from Red Hill to Adelaide represents, I think, a difference in standards. Mr. Bell thinks our estimate is too high. There is a difference in the number and size of sleepers to be used. Naturally we will insist on our standard. We believe that £450,000 will be nearer the actual cost than £380,000. I do not think that the third rail between Red Hill and Adelaide could be dispensed with because, with the exception of the line connecting Port Pirie and Broken Hill, we propose to convert all our lines south to Kadina from 3 ft. 6 in. to 5 ft. 3 in., and as Port Pirie is the natural outlet for a considerable trade in wheat we shall require the 5 ft. 3 in. line to that port in order to meet the needs of the State.

30A. *To Mr. Seabrook.*—I am aware that Mr. Hobler, Chief Engineer for Commonwealth Railways, specifies for Commonwealth purposes 8 ft. 6 in. x 9 in. x 4½ in. sleepers, but we will insist on our 8 ft. 6 in. x 10 in. x 5 in.

31. *To Mr. Cook.* — The officer responsible for our estimate of cost for the third rail to Adelaide compared notes with the Commonwealth officer. We shall insist upon our standard. So far as the third rail between Red Hill and Adelaide is concerned, there will be no change. We think the Commonwealth estimate is too low.

(Taken at Red Hill.)

MONDAY, 13TH FEBRUARY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. McGrath
Mr. Cook	Mr. Seabrook.
Mr. Lacey	

Amos Nathan Harris, Clerk of the District Council of Red Hill, sworn and examined.

32 *To the Chairman.*—The area of the Red Hill District Council is 125,000 acres, and the population is about 1,500 The principal products of the district are wool and wheat. The railway will benefit our north western country. The completion of the line to Red Hill has helped us considerably. I am conversant with the route of the proposed railway, and I approve of it. Residents of Crystal Brook have been endeavouring to secure a deviation of the line through that town. The district water supply is drawn from the Beetaloo reservoir, about 25 miles distant. We are also connected with Bundaleer, near Gulnare, about 30 miles away. In recent years land values in this district have risen. The average holdings are from 700 to 800 acres. We approve of the surveyed route for the line, but we should like it to go nearer Port Pirie, which we regard as our natural seaport. I am not aware of any agitation for the deviation of the line to Port Broughton, but there was some talk about an agitation for the Clements Gap route. Land which could be bought for £15 three years ago is now valued at £20 an acre. I attribute this increase in values to the fact that Red Hill is now a railway terminus, and there is a good prospect of the line being built to Port Pirie. It will be 52 years next September since the first meeting was held in Gleeson's Hotel to agitate for the line. There is no timber for sleepers along the route of the proposed line. We get our gravel supplies from Wheaton's Estate, near Snowtown, and there is also good stone at Collins' quarry, 2 miles out. I do not know of any other stone along the route that could be used. Occasionally we get heavy rains in this district, but our average fall is about 15 inches a year, and the rain is fairly well distributed.

33. *To Mr. Lacey.*—The distance from Red Hill to Wallaroo is over 50 miles, whereas Port Pirie is only 28 miles distant, and, of course, we look upon the latter port as our outlet. The average wheat production in Red Hill district this year is about 18 *bushels. The year before last we got over* 20 bushels, and we have had even a 25-bushel average. During the last twelve months farms in the district have changed hands at from £14 to £20 an acre.

34. *To Mr. Cook.* — There is a strong local feeling that the line should go to Port Pirie. There has been marked increase in the value of land adjoining or near to the recently constructed railway to Red Hill, and one farm of 750 acres is now under offer at about £20 an acre. Generally speaking, the people regard the Commonwealth cattle trucks as unsuitable The 5 ft 3 in. cattle trucks belonging to the South Australian Government are satisfactory. We do a fair amount of business with Port Pirie, and I am sure that the construction of the line to that port will lead to a substantial increase in trade. It will mean a good deal to us in connexion with the purchase of artificial manures, and I believe the price for wheat will be better at Port Pirie than at Wallaroo.

35. *To Mr. Seabrook.* — I should say that about 100,000 acres in the district are suitable for wheat production. Some of our farmers work on the three-years' system, but the majority fallow one year and sow the next. *Between here and Snowtown there* are four stations or sidings to receive wheat. Port Pirie should be our natural shipping port. It is 26 miles nearer than Wallaroo. I think it probable that white ants may cause some trouble, but not more than in other parts of the State.

36. *To Mr. McGrath.*—There has been an increase in land values following the construction of the line to Red Hill. The only Crown land in the district was comprised in the forest reserve, a quarter mile track down to Snowtown. Recently that land was thrown open for selection in blocks of from 10 to 50 acres, and I doubt if there is any left now.

37. *To the Chairman.*—Farmers object to the Commonwealth cattle trucks, because they contain no partitions. When a train pulls up suddenly there is risk of stock falling down and being injured. In addition, the trucks have no shelter. The South Australian broad-gauge cattle trucks are covered, have partitions, and they are not as long as the Commonwealth trucks. Water is obtainable in wells throughout the district at from 30 to 40 feet, but, generally speaking, it is not of good quality, although good enough for stock. There have been no experiments in deep boring for artesian water.

38. *To Mr. Lacey.*—The average assessment of farm lands is from £5 10s. to £6 an acre, and the general rate is 1s. 3d. in the £1. The forest reserve, which was really a travelling stock route, was not required when the railway came through, so it was thrown open for selection in small blocks.

The witness withdrew.

Mathias Martin Coffey, Lake View Farmer sworn and examined

39. *To the Chairman.*—I was born in the district 45 years ago. I am chairman of the Central Railway Vigilance Committee. We have been working for this proposed railway for many years, and we are satisfied with the surveyed route, but the people at Wandearah, a district that has been settled for the last 10 years, and which comprises good wheat growing land, would be better served if the line were swung over a mile or two in their direction. At present some farmers in that district have to cart wheat 15 and 20 miles, so a westerly deviation would be of great assistance to them I am aware that under the agreement the Commonwealth railway cannot cater for local traffic south of Port Pirie, but there will be the third rail on the line between Red Hill and Port Pirie, so the suggested deviation would help them. The country between here and Port Pirie is fair average wheat land. Perhaps it is not quite as reliable as the country between here and Snowtown, but nevertheless it is good wheat land. I am not acquainted with the country north of Port Pirie. Farmers in my district have reaped as high as 35 bushels an acre, but I cannot say what is the average production. My own average is round about 22 or 23 bushels an acre. Land values range from £15 to £16 an acre. There has not been much variation during the last five years. Four years ago a farm was sold at £16 an acre. The size of the average holding is about 800 or 900 acres. The "big" men would hold twice or sometimes more than twice that acreage. In my opinion, a man requires about 1,000 acres for mixed farming. It might be possible to do with less, but if I had to begin life over again I should like to have about 1,000 acres. There is no Crown land available for settlement in my district. Some of the areas are held under leasehold, but the majority are freehold. The Bundaleer water cannot be used for irrigation, but stock do well on it Since Bundaleer water became available there have been no experiments with district wells. Generally speaking, good stock water is obtainable from wells at from 65 to 75 feet

40. *To Senator Barnes.* — I cannot say how many people would be served by the suggested western deviation to serve the Wandearah people, but I know that many farmers there have to cart their wheat long distances.

41. *To Mr. Cook.*—I have not been over the surveyed route from Red Hill to Port Pirie, but I have been informed by residents along the route that the district would be served better if the line were swung a mile or two to the west. I do not think that this deviation would add much to the length of the railway. I cannot say if the proposed line will make much difference to wool-growers whose product has to go to Port Adelaide, but I should say that Red Hill farmers will benefit to the extent of 1½d. a bushel at Port Pirie as against Wallaroo. The Broughton flats are splendid for stock-raising.

42. *To Mr. Seabrook.*—There is very little waste land in the district. It would be well within the mark to say that the land produces an average of 15 bushels. I presume there are engineering difficulties to prevent the line going into Port Pirie. If there are not, I think the line should go into that town. Wool would still go to Adelaide, because the wool sales are held there. I have made a standing offer to the South Australian Government to share half the cost of a trial bore for artesian water, because I believe we shall be able to get a good supply.

43. *To Mr. McGrath.* — The suggested deviation to meet the wishes of the people of Wandearah West would give them facilities which they have been seeking for the last 40 years.

44. *To Mr. Lacey.*—The distance from Red Hill to Crystal Brook is only 12 miles. If the line went via Crystal Brook, Wandearah people would have to cart their wheat 17 miles to Crystal Brook or Port

Pirie. A line on that route would not be of the slightest advantage to the Wandearah settlers. The *distance from Red Hill to Wallaroo is 56 miles*, and from Red Hill to Port Pirie it is 28 miles. The line would take the wheat from at least half the distance between Port Pirie and Wallaroo to Port Pirie as the shipping port. *Last year we reaped 23,000 bags at* Lake View. All this wheat would naturally go to Port Pirie. I believe that the higher price for wheat which would then be realized at Port Pirie would result in certain properties, which are now carrying sheep, being turned over for wheat production. Some of the land in my district is not being utilized to its fullest capacity, and I feel sure that country which carries only a sheep or a little more to the acre, and which is capable of producing up to 35 bushels to the acre, will eventually be put to better use.

45. *To the Chairman.*—When my committee was formed twelve or thirteen years ago, our principal object was to link up Red Hill district by railway with Port Pirie. I am firmly convinced that but for political influence the line from Salisbury to Port Augusta would have been constructed by the time the east-west line was built, and that it would have saved 50 per cent. of the taxpayers' money to-day.

The witness withdrew.

Stephen March, Storekeeper, Red Hill, sworn and examined.

46. *To the Chairman.*—There has been a strong agitation for some time for the construction of this proposed line to Port Pirie through Wandearah. I was secretary of the Central Railway Vigilance Committee *for about twelve years. We have been advocating the* construction of the line from Salisbury to Port Augusta. I am well acquainted with the country between here and Port Augusta. The general opinion *is that people along that route will benefit greatly from* the construction of this line. Many farmers of Wandearah have to cart their wheat 18 miles or 20 miles to either Crystal Brook or Port Pirie, so the line will serve them. Several farmers *along the Broughton* River flats are growing lucerne. With this railway it will be possible for them to increase their production and so add to their income. The land to be served by the line is fairly closely settled. Wheat has been grown down to the swamps near Port Pirie. The distance which a farmer can carry wheat profitably depends on the price and the nature of the road, but I should say that 20 miles haulage is a long distance. We think that farmers situated within 8 miles of the proposed railway will cart to the line.

47. *To Mr. Seabrook.*—The bulk of my business is done direct with Adelaide, so the line to Port Pirie will not be much advantage to me as a business man, as I do not touch wheat. Petrol is delivered direct from the ships at Port Pirie, and as we would save 1s. a case naturally we would get our petrol supplies through Port Pirie.

48. *To Mr. McGrath.*—I do not think the State Government would undertake the construction of this line. I was not aware that under the agreement the Commonwealth Government will not be permitted to cater for local traffic between Red Hill and Port Pirie.

49. *To Mr. Lacey.*—Last year about 70,000 bags of wheat came into Red Hill. I cannot say what the amount is likely to be this year, because a severe storm recently destroyed from 15,000 to 18,000 bags, but in an average year we should get about 85,000 bags at Red Hill, and about 25,000 bags at Collinsfield.

The witness withdrew.

Frank Garden Jackson, Wheat Agent *at Red Hill for* Dalgety and Company, sworn and examined.

50. *To the Chairman.*—I do not know the country between here and Port Pirie. I estimate that the area under cultivation in the vicinity of Red Hill is 16,000 acres. We truck the wheat from Koolunga, Merriton, and Clements Gap. The Wandearah wheat goes to Port Pirie. I believe that all the wheat from *as far as Burnsfield will be delivered at Port Pirie* when the line is in operation. The freight from Red Hill to Wallaroo is 3½d. or 4d. a bushel. Wheat at stations nearer Wallaroo is higher. For example, at *Collinsfield the price is ½d. a bushel higher than at Red* Hill, and so on down to Snowtown. We believe that the freight from Red Hill to Port Pirie would be from 2d. to 2½d. a bushel as against 3½d. to 4d. to Wallaroo.

51. *To Mr. Lacey.* — Snowtown is a larger wheat centre than any town along the route of the proposed railway to Port Pirie.

52. *To Mr. Cook.*—The people in the district are unanimously in favour of the construction of the line

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(Taken at Port Pirie.)

TUESDAY, 16TH FEBRUARY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. McGrath
Mr. Cook	Mr. Seabrook.
Mr. Lacey	

Ernest Edwin Garrett, Town Clerk, Port Pirie, sworn and examined.

53. *To the Chairman.*—Assuming that by means of the third rail the 5 ft. 3 in. line will be brought into Port Pirie the people here desire the proposed Commonwealth line to come into the town. Produce grown 30 or 40 miles south of Port Pirie will be drawn to this port, and therefore the line from Red Hill will meet all our requirements if the route endorsed by the South Australian Railways Standing Committee is adhered to. That route is quite in accord with our views up to a point a few miles on the south side of the town. The Commonwealth proposal is to cross the 3 ft. 6 in. line 1 mile 50 chains out of the town. The people of Port Pirie contend that the railway should be built along the 3-chain road, enter the town boundary on the south, pass through Solomontown, and pick up the Commonwealth survey a little distance north of the town. We do not advocate that the 4-ft. 8½-in. gauge should come into Ellen-street, as we have trouble enough with the existing 3-ft. 6-in. gauge. We wish the 4-ft. 8½-in. line to come into the Solomontown station for the general convenience of the people and for the passenger traffic which it would develop. We recognize that the commercial aspect is met in another way. I understand that the original proposal to cross the 3-ft. 6-in. line 4 miles out of the town is *not now being adhered to. If it were*, we would strenuously oppose it. The proposal now is to have a station 1 mile 50 chains out, and we are suggesting that it would be better to have it at the Solomontown *station. Naturally people would prefer joining the* overland train at Solomontown rather than 4 miles out as proposed originally, or 1 mile 50 chains out as now proposed, but we would prefer to have the *line in the town. If we had an assurance that* the 5-ft. 3-in. line from the south would be brought into the town, and if the necessary facilities were provided on the wharf for handling the trade, there would probably be *little* reason to advocate bringing the 4-ft. 8½-in. line in so close as far as trade from the south is concerned, but it would certainly be of advantage to Port Pirie in regard to trade over the 4-ft. 8½-in. line from the north. I doubt if many passengers would join the transcontinental train from Port Pirie, because, with the 5-ft. 3-in. connexion and two trains a day to Adelaide, our requirements should be met. I was not aware that the proposed deviation would mean an added cost of

from £20,000 to £30,000. From the point of view of passenger traffic it might not be warranted, but we have to take into consideration the possibility of trade development generally resulting from the proposed extension of the northern line from Oodnadatta to Alice *Springs. All that traffic will come along* the proposed new line from Port Augusta to Red Hill, and Port Pirie should get its share. I know that the Commonwealth will not be able to cater for traffic south of Port *Pirie, but I think a certain amount of trade from* the north will come to this town, so the nearer the connexion is to the town the better it will be for Port Pirie. I favour the route along the 3-chain road as *suggested in a petition presented to the State* Parliament. So far as I am aware, it offers no engineering difficulties, and compensation claims at Solomontown should not be heavy. After passing through the *town and various suburban sections it should pass the* creek at the rifle butts, and continue through sections 365, 368, 371, 372, 375, 349 and other sections in the Hundreds of Pirie and Telowie. It should be nearer the coast than the present survey. I know the country very well. The general opinion is that on the coast route, as it is called, there will be less risk of drift sand. It is probable that the prevailing winds will cause a good deal of trouble with sand drifts on the surveyed route. We are also anxious that the line should be along the coast route, because we wish to take advantage of the Telowie beach and the beach facilities at Port Germein. Our present means of communication with Port Germein is by water and road. A small steamer calls at intervals We wish to emphasize the possibilities of developing passenger traffic between Port Pirie and Telowie Beach as well as between Port Pirie and Port Germein. Although Port Pirie is a seaport it has nothing to offer in the way of beach facilities. Many of our people go to Telowie beach by motor, and we believe that if the proposed line from Port Pirie to Port Augusta followed the coast route an important passenger trade would be developed, besides which the distance to Port Augusta would be lessened.

54. *To Mr. Lacey.*—I have been over the route to Port Germein on several occasions. As far as I am aware, the line we suggest presents no engineering difficulties. I am surprised to learn that the suggested deviation from Red Hill to Port Pirie will increase the length of the line by 2 or 3 miles, but that would apply to the alternative route 4 miles out—not the one at 1 mile 50 chains now being considered. The deviation we suggest on the northern side will mean a shorter line, and therefore should compensate to some extent for any extra expense incurred in coming through Port Pirie at a point nearer than is indicated by the survey. If the line follows the 3-chain road from a point on the surveyed route from Red Hill it will not be necessary to purchase portions of any farm lands, but no doubt the Government will have to buy a number of unimproved blocks in Solomontown. I think they can be purchased at round about £15, but the land on the Balmoral-road is fairly valuable. The land around by the brick kilns is cheap. So far as I know, there is no expensive land on the suggested route. It may be necessary to cut through three or four town sections to get to the Port Germein-road, but they are not of much value.

55. *To Mr. Seabrook.*—I cannot say what advantage would accrue to the Commonwealth if the line were brought into Port Pirie. I am stating what the advantage would be to the town of Port Pirie.

56. *To Mr. Cook.*—The route along the 3-chain road *from Red Hill to Port Pirie indicated in the report of* the South Australian Railways Standing Committee is entirely approved by the people of Port Pirie. The only difference of opinion is in regard to the point where *it should enter Port Pirie. We are asking that it* should be much nearer the sea coast on the northern side, because we are anxious to have railway connexion with Telowie Beach and Port Germein The Commonwealth survey is not near enough to the coast to be of much value as a line to Telowie Beach or to Port Germein. Most of the town sections which the railway would pass through are valued at from £10 to £12 per acre. This does not apply to the subdivided land facing streets which the railway might cross, but that portion is limited in area. We do not think that the land to be purchased in the town will cost as much as farm lands which will have to be bought on the surveyed route, and we know of no engineering difficulties on the route we suggest. A certain area of land for railway yards will be provided by the corporation. The railway station could be on park lands in the town at no cost to the Government.

57. *To the Chairman.* — The land required for the station would be a gift by the corperation. The citizens would not object to part with a sufficient area for that purpose, and I do not think the State Government would object either. The agreement between the Commonwealth and State Governments states, in *clause 5, that the route of the railway shall*, from a point between Port Pirie and Red Hill, be, as far as practicable, the route recommended by the Railways Standing Committee, and I suggest that the Commonwealth survey does not follow *the route recommended* by that committee after it reaches a point several miles south of Port Pirie. The survey was made before the Railways Standing Committee issued its report.

58. *To Mr. McGrath.*—I have not seen any estimate of cost furnished by the Railways Standing Committee, but I have no doubt that evidence as to cost was obtained, and that it will be available We are advocating the route recommended by that committee, and our claim is strengthened by clause 5 of the agreement. The Telowie Beach, with which we are anxious to have railway communication, extends for 5 miles parallel with the proposed route from a point 10 miles out from Port Pirie The Commonwealth survey passes that beach 2 miles away, so it will be of no use to us Our proposal would take the line within a few hundred yards of the beach. I feel sure that if the line is taken along that route the Commonwealth railway authorities will reap considerable revenue from passenger traffic.

The witness withdrew.

Edmund Ebenezer Davis, Clerk of the District Council of Port Pirie, sworn and examined.

59. *To the Chairman.*—Our district extends 20 miles south to the boundary of the Hundred of Wandearah and north to the boundary of the Hundred of Telowie. It comprises an area of 248 square miles, and has a population of 1,957. The capital value of its land is £737,510. My district extends only 9 miles north of Port Pirie, but I am well acquainted with the country beyond that point. It is a narrow stretch of agricultural and grazing land between the coast and the Flinders Range. The holdings generally are 1 square mile in area or thereabouts. There are a number of working men's blocks along the cattle track from Warnertown towards Port Augusta and a fair number of small land-holders are engaged in gardening operations on the western slopes of Flinders Range. A number of the farmers strongly object to the line cutting through their property, but I do not think that any great injury will result, and I have no doubt that they will be adequately compensated. Recently my council passed the following resolution:—"That in the opinion of this council the line should run into Port Pirie, or as near thereto as possible." If the 5-ft. 3-in. line is brought into Port Pirie, and if the Commonwealth railway is within a mile of the town, the land holders south of Port Pirie would get practically all that they have been asking for. This remark does not apply to land-holders north of Port Pirie. This town is a big commercial centre. Large oversea steamers call here, so it is desirable that the line should be brought in as

near as possible to the seaport It would then be a distinct advantage to the owners in northern stations, many of whom live in my district.

61. *To Mr. Seabrook.*—Most of the trade from my district comes into Port Pirie. Nearly all the butchers in Port Pirie have their slaughterhouses in my district and close to the boundary of the town, so a direct line to Port Pirie would be of value to them. In the event of abattoirs being established here, it is possible that the selling yards would be outside the town boundary. Nevertheless I think that it would be an advantage to bring the line into the town The suggested deviation north of the town would be best, because there would not be the same risk of sand drifts. Some of the best farms north of Port Pirie have been sold at up to £10 an acre

62. *To Mr. McGrath* I think that the Government would not have to pay so much in compensation if the coast route were adopted Beyond that I do not think there is very much in the proposal.

62. *To Mr. Lacey* There is a motor mail and passenger service between Port Pirie and Port Germein. The council boundary extends to what is known as Williams' Corner, 9 miles north of Port Pirie We have had no serious trouble with sand drifts on that road There was a time when we had to use a scoop, but we have overcome our trouble by clearing all the bush off the road Our experience is that the best way to avoid sand drifts is to clear away all obstacles, and I am afraid that a high ballasted line will cause trouble. If the deviation is made, and the coast route followed, there should be little or no difficulty with sand drifts, because on that route the sand would only drift with easterly winds, which are not prevalent. If, however, the line follows the present survey there will be times when paddocks are lying fallow on both sides of the line Undoubtedly there will then be sand drifts when the wind is blowing strongly We always had a certain amount of trouble until this year. Last year we cleared the road right through, and though there have been strong winds this year, places where sand drifted formerly are now quite clear.

63 *To Mr. Seabrook* The butchers' slaughteryards are situated at various points from east to south-west of the town, so if cattle were brought into Port Pirie by the Commonwealth line they would be in a central part Many of the butchers have their own slaughteryards Some have what is known as a private slaughtering licence and do killing for other butchers The fees range from £2 2s to £5 5s a year We are hoping eventually to have municipal abattoirs for Port Pirie These may be situated on the western side of the town A considerable number of the residents of Port Pirie depend on the smelting works If they are removed the town would suffer very seriously.

The witness withdrew.

Harry Jackson, Manager of Commonwealth Coal Gantries, Port Pirie, sworn and examined.

64 *To the Chairman* I am afraid that the 4-ft 8½-in railway will not be of much benefit to Port Pirie as far as the district immediately north of this town is concerned because transhipment costs, owing to break of gauge will be an obstacle Wheat is the principal product grown between here and Port Augusta The third rail connecting Port Pirie with the 5 ft 3 in system from Red Hill will draw wheat trade from the State central railway system to this port I cannot imagine any trade from the Alice Springs district coming to Port Pirie. If the great northern line is constructed, and if the mineral resources of the Macdonnell Ranges develop as anticipated possibly the 4 ft 8½ in. line will carry a certain amount of concentrated ore to Port Pirie for treatment at the smelters here, but unless the 4-ft. 8½-in. gauge is extended to the centre of activity it will serve no useful purpose If the connexion is 1 mile away from the smelters it might just as well be 2 miles, because the cost of transhipping wheat or other commodities from the 4 ft. 8½ in. to the gauge leading into Port Pirie will be too great. We ship a great deal of wheat from Port Pirie, which ranks with Wallaroo as the second wheat exporting centre in South Australia. I am well acquainted with the country between Port Pirie and Port Augusta. Only a small area is suitable for wheat. The cultivable area narrows the further you get north. The best of the agricultural land is between here and Port Germein, and most of the farmers are engaged in mixed farming. Beyond Port Germein the rainfall is so uncertain that wheat-growing is too precarious an occupation. The average size of holdings on the other side of Port Germein is between 700 acres and 800 acres, not counting the "blockers" who are engaged in gardening operations. From a commercial point of view, I doubt if the railway will benefit Port Pirie to any extent, because the 4-ft. 8½-in. gauge will not connect up with the wharf, and the station will be too far away. If the Commonwealth line is linked up with the wharf, Port Pirie will probably get all the wheat grown 7 or 8 miles out to the north and right up to Horrockes Pass. At present all that wheat goes to Port Germein, where the shipping facilities are poor There is only one berth there loading up to 21 feet. As a through line and part of the scheme for the transcontinental railway, I think the proposal is an admirable one, and I have no doubt that it will attract a number of visitors to Port Pirie for the purpose of inspecting the smelting works, which are the largest and most comprehensive of their kind in the world.

65. *To Mr. Cook.*—The 5-ft. 3-in. gauge line, if it is brought on to the wharf, will be a distinct advantage to Port Pirie, but if it is not the line will be of no value commercially to this town. If the mineral developments of the Macdonnell Ranges are important I anticipate that the concentrates will be treated here, but it seems to me that eventually Port Augusta will be the natural outlet for trade from the north-south line, and if the proposition were good enough, smelters would probably be established there, or else in the Macdonnell Ranges. All the coal for the South Australian narrow gauge system between Port Pirie and Brinkworth, Terowie, Orroroo, Wilmington, and right up to Broken Hill is supplied through Port Pirie. All that we want now is connexion with the 5-ft. 3-in. line from Red Hill, so that Port Pirie may get its fair share of the produce grown in the central district. At this port we can accommodate ships up to 12,000 tons. We can load vessels up to 25 ft. 3 in., but we feel that there ought to be more water. At the wharf we have 20 feet at low water and 18 feet in the channel at low water. The trade of that port justifies a greater depth.

66 *To Mr. Lacey.* If the 4-ft. 8½-in line were brought into Port Pirie this town would attract practically the whole of the wheat grown between here and Port Germein Generally speaking, labour in Port Pirie is absorbed Last month and in the early part of this month it was quite a common experience to have two or three gangs for each ship. Sometimes steamers were lying idle owing to the scarcity of labour. In the winter months there is usually a surplus, and it would be an advantage to have extra work available in the slack months of the year. It would mean much to the town if construction work on this railway started simultaneously from both Port Augusta and Port Pirie.

67. *To Mr. Cook.*—The smelting works are the main support of the town. They employ about 1,400 men.

68 *To the Chairman.* — I do not anticipate any trouble with sand drifts on the surveyed route to Port Augusta In my opinion, what is known as the top road is much freer of sand than the lower road, but in any case the sand trouble is not very important. I should say that there is more likely to be trouble between Bowman's and Two Wells than at any point between here and Port Augusta.

The witness withdrew.

Lambert John Phillip Roper, Manager of the Farmers Union at Port Pirie, sworn and examined.

69. *To the Chairman.*—The total of the wheat shipped at Port Pirie last year was 1,500,000 bags. This year we anticipate shipping 1,300,000 bags. This wheat comes from as far as Orroroo, Wilmington, Terowie, Yarcoa, and all stations in between. Crystal Brook was a big wheat centre until Red Hill became a railway terminus. At present wheat from Red Hill goes to Wallaroo, but when there is railway connexion with Port Pirie we believe that at least 250,000 bags of wheat which at present is shipped at Wallaroo will come to Port Pirie. I estimate that all wheat from as far as Burnsfield will come this way. I was wheat buying at Port Germein for some years. That district seemed to do better than that it is now. Last year Port Germein shipped 29,000 bags, and this year 34,000 bags, representing the sum total of the produce from holdings on the western side of the Flinders Range from a point 8 miles north of Port Pirie. The 4-ft. 8½-in. railway will not make much difference to the wheat trade from districts north of Port Pirie unless the line is brought on to the wharf here, and it is hardly likely that we shall have three gauges on the wharf. The shipping facilities at Port Germein are not as good as they might be.

70. *To Mr. McGrath.*—I do not think that the construction of the railway between Port Pirie and Port Augusta will lead to increased settlement. An ample water supply would have more effect on settlement than the construction of a railway.

71. *To Mr. Lacey.*—Wheat is carted to Port Pirie from Wandearah, a distance in some instances of 22 miles. With the construction of a line the longest cartage for farmers there should be about 12 miles, and the average about 7 miles, assuming a siding was put in.

72. *To Mr. Seabrook.*—If the railway came into the town we should still have to handle wheat at Port Germein. I do not think it would make much difference if the station were located at Solomontown.

73. *To Mr. Cook.*—I think the route between Port Pirie and Red Hill should deviate a mile or two to the west to serve the western Wandearah farmers, some of whom have to cart their wheat to Port Broughton. All our farmers get their artificial manures from Wallaroo, so the construction of a line will be a very great advantage to them.

The witness withdrew.

Ernest Harry Green, Draper, Port Pirie, sworn and examined.

74. *To the Chairman.*—I am secretary of the Retail Drapers' Association of Port Pirie, and represent that body. In general terms we are satisfied with the proposal to link up Port Pirie and Adelaide with the 5-ft. 3-in. gauge, which will enable Port Pirie to attract trade which naturally belongs to it. We believe that the line should come in as near as possible to the town. We realize, of course, that the proposal is for a through railway from Port Augusta to Adelaide on the most direct route, but we think that travellers on the transcontinental line would be glad of an opportunity to get in touch with Port Pirie, which is so well known as the centre of the largest ore smelting works in the world. We feel sure that many travellers would break their journey here, and spend a few days in this town. Port Pirie is sadly in need of modern beach facilities. It has only one small beach which a local committee is endeavouring to improve, but, unfortunately, the average working man has practically no where to go except at considerable expenditure. If the railway from the north came in close to the town we should be linked up with a splendid beach at Telowie, 9 miles distant, and our people would be able to take advantage of its facilities at a reasonable cost. An attempt has been made to develop traffic to the beach by motor vehicles, but the average working man cannot afford the expense.

75. *To Mr. McGrath* —If provision could be made for our citizens to reach Telowie beach by rail motors the department would reap a big revenue from this class of traffic.

76. *To Mr. Lacey* —If the line north to Port Augusta were taken near the beach the route would be shorter and a big holiday traffic would be developed. If, however, the connexion were made at 2 miles 50 chains from the centre of Port Pirie, the average working man would be unable to take advantage of it. It would not be nearly as attractive as a station only 1 mile away

77. *To Mr. Seabrook.* — I am not personally acquainted with the route, but I understand that the suggested deviation to bring the line nearer the beach and Port Germein would lessen the distance. There is a fair amount of holiday traffic already with Telowie Beach and Port Germein, and I am sure that if we had a railway near the beach it would be developed considerably. Motor transport is unsatisfactory on account of the overcrowding. There would be a steady traffic all the year round if we had the railway. The fare by motor bus to Telowie beach is about 4s., and there are not nearly enough vehicles plying for hire. It would take a very large number of motor buses to transport 5,000 men, women, and children to the beach. Moreover, it is not possible for motor buses to handle the traffic all the year round, because at certain seasons of the year the road is impassable. If we had the rail way nearer the coast it would be possible for our people to get to the beach for about 1s. 6d. return as against 4s. charged by the buses. We anticipate that the bulk of our goods from Adelaide will come over the 5-ft. 3-in. line.

(Taken at Port Pirie.)

WEDNESDAY, 17TH FEBRUARY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr McGrath
Mr. Cook	Mr Seabrook
Mr. Lacey	

Harry Wills Sampson, Butcher, Port Pirie, sworn and examined.

78. *To the Chairman.*—I have been engaged in the butchering business in this town for the last 37 years. For about three months of the year we get our supplies locally. Stock sales are held here monthly. Port Pirie butchers also attend sales at Gladstone, Crystal Brook, and Jamestown, and rail the stock to Port Pirie. Every farmer in the district keeps a few sheep, but the bulk of our supplies comes from the north. With the construction of the 4-ft. 8½-in. line we should be able to draw on the north-west also. At present stock from the north-west is railed via Peterborough I think that stock from beyond Port Germein would be railed to Port Pirie market. The country to the west of Port Augusta would also be opened up by this line. If the 4-ft. 8½-in line came into the town stock could be unloaded into the trucking yards. We are hoping, in the not distant future, to have abattoirs established here, and we expect then to have weekly stock markets. The abattoirs, I think, should be on the open space about three-quarters of a mile south from the post office. In our opinion the proposal to cross the 3 ft 6-in line 2½ miles out of the town is not the best one It would be inconvenient for butchers. There are about nineteen butchering establishments in Port Pirie. All our killing yards are outside the municipal area, some being about 3 miles distant from the town. The average consumption in Port Pirie is about 100 head of cattle a week, and 1,000 head of small—calves, sheep, and pigs.

79. *To Mr. Cook.*—We do not always know where our supplies come from, but I think about one-half

come from the north-west, which embraces Baroota. There is a weekly stock market at Crystal Brook, and a monthly market at Port Pirie. The line to Port Augusta will represent a saving of about 50 per cent. in the distance which stock intended for Port Pirie will have to travel. We get a good deal of stock from as far down as Iron Knob. All these supplies would come over the 4-ft. 8½-in. line.

80. *To Mr. McGrath.*—It is probable that with the construction of a line cattle sales will be held here instead of at Crystal Brook. Wallaroo butchers will then come here for their stock instead of going to Crystal Brook.

81. *To Mr. Lacey.*—The area suggested for the abattoirs is known as "*jam tin*" *park. It is low-lying,* and some difficulty might be experienced *in flushing* drains, but the same trouble would be experienced at any other place.

82. *To Mr. Seabrook.*—The jam tin park reserve is a large open space that will never be occupied. Drainage will be *difficult in any part of the district.* We shall have to drain into the *river. The suggested site* is quite three-quarters of a mile from the post office. There is ample room for the abattoirs there. If the station were located in that reserve, and the abattoirs were established somewhere else, we should have to *drive stock out to the abattoirs.* That would be inconvenient as well as costly. I *do not think that the* establishment of the abattoirs in the reserve would lead to any congestion. If we could utilize that reserve properly it would be a good thing. Solomontown *is more* closely built on than any of the suburbs. In *Adelaide the abattoirs are 5 or 6 miles* from the city, but there are dwelling houses *in close proximity. From* our point of view it would be an advantage to have the station on jam tin park reserve if we could get the abattoirs there too. Of late the council has been *giving* some attention to the question of abattoirs for *the town.*

(Taken at Wandearah.)

THURSDAY, 18TH FEBRUARY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Richard James Davidson, *farmer, Wandearah,* sworn and examined.

83. *To the Chairman.*—I am *president of the local* Farmers' and Settlers' Vigilance Committee, which has been in existence for about nine years. We have made representations to the South Australian Government *for the construction* of this line, and have given evidence on several *occasions before the* South Australian Railways Standing Committee. Our object has been to secure a deviation of the line more westerly through Munday's Gap, striking the 3-chain road about G. Robertson's old place, and crossing the River Broughton at what is known as Cocky's Crossing, thence following the 3-chain *road to Port Pirie* or Solomontown We believe that a railway along this *route will serve* the district better. There is a good number of settlers on land between the 3-chain road and the coast. For the last 40 years we have had to cart our produce to *Port Pirie,* in some instances a distance of 18 or 20 miles. The *roads are fairly good.* My place is in Wandearah West, 18 miles from Port Pirie. I *am on* the 3-chain road near Butler's Bridge, and about 10 miles from the surveyed route. I would cart my produce to the railway. At present it takes me two days *to go* to Port Pirie and return. I could do a trip a day to the railway line. The average area of holdings in Wandearah ranges from 800 to 1,000 acres. It is *all* good wheat-growing land. There is very little *Crown land available.* Farmers within 10 miles of Port Pirie *would not use the railway,* but would continue to cart to Port Pirie. We are *not opposed to* the present survey, but we feel that we would be better served if the line followed the 3-chain road, because every mile of cartage makes a difference to a *farmer's team* when he has a load on. Land in this district is *valued at from £5 to £8 an* acre, and the rates are fairly high, about 6d. *in the £1. There is* a good deal of settlement further out south and southwest of my place. All those people are interested in this proposal. Farmers from the Hundred of Mundoora would cart to the line. Our suggestion is that *the line should strike the 3-chain* road at George Robertson's place, section 319, *and swing in a westerly* direction.

84. *To Mr. Seabrook.*—I have been a resident of this district for 52 years. It is about 7 or 8 miles from here to the nearest point on the proposed railway. The suggested *westerly deviation will* mean a great deal to those farmers who *have to cart their wheat* the longest distance at present. We would use the railway in preference to motor lorries for the cartage of our produce. About 100,000 bags of wheat were produced here last year, as well as a fair number of cattle and sheep.

85. *To Mr. Lacey.*—Some of the settlers further out have to cart their wheat 24 miles to Port Pirie. It is about 17 or 18 miles to Crystal Brook. A considerable amount of cream is sent from this district to Port Pirie Just now the roads are better than at any other time of the year. *In the winter months* they are almost impassable. Farmers within 10 *miles of a siding* would use the railway instead of carting all the way to Port Pirie.

86. *To Senator Barnes.*—It costs me from 1s. to 1s. 2d. a bag to cart my wheat to Port Pirie. The suggested *deviation will* mean a difference in cartage of 3 miles to me. This *represents about* 2d. a bag.

87. *To Mr. McGrath.*—I *am aware that representations* have been made for the line to go through Crystal Brook. In support of their request the Crystal Brook people included in their estimate of production the *wheat that* is grown in Wandearah, Red Hill, Mundoora, *and Merriton.* If the line goes as we suggest, Crystal Brook will not get that wheat.

88. *To Senator Reid.*—Our principal productions are wheat, butter, and cream. Practically the whole of it will be carried over the railway. Several farmers who are engaged in dairying have to cart their cream and *milk twice* weekly to Port Pirie.

89. *To the Chairman.*—I *cannot say how much* cream from this district is sent to the butter factory at Port Pirie. Sometimes dairymen cart more often than twice weekly. The dairy farmers are located along the River Broughton. We regard the Wandearah district as equal *to any district* in the State from the point of view of wheat production, *the average yield being* from 15 bushels to 18 bushels.

90. *To Mr. Lacey.*—There is a possibility of developing market gardening operations along the Broughton River if the railway facilities are satisfactory. Some *excellent fruit* is grown under irrigation in the district.

The witness withdrew.

William David Brechin, *wheat farmer,* Wandearah East, sworn and examined.

91. *To the Chairman.*—My district will be *fairly* well served by the proposed route, but we think that the suggested deviation will serve us better. Any man within 6 or 7 miles of a railway is in a good position. *If a siding* is placed near the Wandearah East school it will be used by *farmers who at present* have to cart wheat 20 to 24 miles to Port Pirie. *The line will be* useful for stock, because the last mile and a half is always the worst with travelling sheep, and 14 miles is a long day. At present we have to take our sheep that

distance to Crystal Brook. *There is a fair* number of sheep on the lower country Nearly every *farmer in* this district carries from 100 to 200 sheep. Land along the River Broughton is suitable for intense cultivation, *so that* the nearer the railway is to settlers along the river the better served they will be.

92. *To Mr. Lacey.*—I *live on* the eastern portion of the district, so the deviation does not *interest me to any* extent. Farmers in my district will cart to a siding, as the shorter distance compared with cartage to Port *Pirie will* represent about ½d. a bushel.

93. *To Mr. Cook.*—I have been farming all my life Land in the *vicinity of my place* is worth from £10 to £15 an acre. Since 1915 my average *production* has been about 16 bushels an acre. I fallow portion of my farm, and carry about 300 sheep. I could carry more *stock if we had* better railway facilities, but I doubt if *a greater area will be* put under cultivation for wheat, as we crop *practically all the land* that is available. It costs from 1s. 2d. to 1s. 3d. a bag to *cart wheat to* Port Pirie, a distance of about 20 miles. Land along the River Broughton is splendid lucerne country, and suitable for dairying.

94. *To Mr. Seabrook.*—Cattle grown in this ditsrict are sent to Crystal Brook and Adelaide, but not, as a rule, to Port Pirie. The Port Pirie butchers buy at Crystal Brook. At present the nearest railway is at Crystal Brook, 14 miles distant, so the proposed new line would bring us within 7 or 8 miles of a railway.

The witness withdrew.

Henry Crouch, farmer, Merriton, sworn and examined.

95. *To the Chairman.*—I have lived in Merriton for 50 years, and I also own land in this district. I am *not so badly off,* because I am within 9 miles of a railway line, *and any one as close as that to a line* cannot complain. My *sympathies are with the* people at Wandearah, because I have been through *the mill* myself. I have started out with a load of wheat at 9 o'clock at night, travelled all night into Port Pirie, and got home some time the next day. I am *supporting the proposed deviation* more for the sake of the *people further back, because* I know what the absence of railway facilities *means to a farmer. It* stands to reason that a man cannot spend so much of *his time* carting wheat and attend to his ordinary farm work afterwards. This country can produce splendid fat lambs. The railway is urgently needed; it will make *life worth living.* There is splendid country between here and Red Hill. *In some seasons* we have produced from 9½ to 10½ bags of *wheat to the acre* at Merriton.

96. *To Mr. Seabrook.*—The State Government has been considering a proposal to dam the Broughton River. At certain seasons of the year a great deal of *water is lost.* Lucerne will grow along the Broughton River flats *without irrigation.*

97. *To the Chairman.*—*It might* be argued that an additional expenditure of *£20,000 to swing* the line further west is not warranted, but it will *mean a great* deal to a considerable number of farmers who *at pre*sent have to cart their produce long distances to Port Pirie.

98. *To Mr. Lacey.*—I have grown lucerne on my *land,* but we have long spells of dry weather. With *irrigation, lucerne growing* is an unqualified success. I feel sure that *the railway will lead to increased* production, because many young men will be *encouraged* to remain on the land.

99. *To Mr. Seabrook.*—I cannot say definitely how many young men from this district have gone off the *land, but I know* of two who have given up because of *the long distance which* they had to cart their produce. The labour difficulty *is also a problem.* If we could do our work in eight hours, it would be all right. I do not blame the men if they can get something better, but the farmers have to suffer.

100. *To Senator Barnes.* We pay £5 a week and keep for harvest hands. This work lasts about two *months.*

101. *To Senator Reid.*—It is hard to say how many farmers will benefit by *the suggested* deviation. All the country is settled. Some *farmers nearer the coast* will be better served if the route follows the 3-*chain* road. It is not likely that the railway will lead to the introduction of new settlers, but it is possible that more *wheat* will be grown, and some farms might be cut up *into smaller areas.*

102. *To Mr. Cook.*—The average holding in this district is about 700 or 800 acres, valued *at about* £12 an acre. A man should be able to make a good living off that area. I do not know of any country in South Australia more in need of railway facilities. We are *unanimously* in favour of the construction of the line.

The witness withdrew.

John Henry Jacobs, *dairyman,* Wandearah, sworn and *examined.*

103. *To the Chairman.*—About ten years ago we tried to supply Port Pirie with milk by *means* of motor lorry. We kept going for four or five years, but the roads became so bad that our lorries would not *stand* the traffic. The proposed deviation will help us a good deal. We are located 2 miles below Cocky's Crossing, and we *find the distance* to Port Pirie too far to cart milk twice a day. This is good country for sheep fattening. The surveyed route is *not near enough to* the Broughton River to materially benefit those who are engaged in the dairying industry, but we welcome *the* proposal nevertheless, because we shall be within *6 miles of a siding.* The Broughton River flats have great possibilities. *We have a natural* irrigation nearly every year, when the river *overflows its banks.*

(Taken at Port Germein.)

FRIDAY, 19TH FEBRUARY, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Stanley Garnet Stone, farmer, Baroota, sworn and examined.

104. *To the Chairman.*—We, who are chiefly interested in the route of the railway between Port Pirie and Port Germein, do not approve of the survey, be*cause the line* will cut through a number of valuable agricultural *lands valued at from* £8 to £10 an acre. The alternative route which *we advocate* follows closely an old survey through the *western side of sections* 365, 387, 371, 372, 375, and 312, Hundred of Pirie, and sections 349, 351, 352, 393, 353, 408, 407, 406, 105, 404, 403, 402, 401, 400, 399, 398, and block L, through park *lands to the* railway and show reserve adjacent to Port Germein, *linking up with a* line surveyed by Mr. Waters, a short distance north of *Germein.* The Commonwealth survey will cut through *agricultural* lands for a distance of 12½ miles, and, as the *farms* are worth from £8 to £10 an acre, the land to be acquired will cost about £2,000. We contend that the deviation along *what is known* as the coast route will be less costly, as most of the land belongs to the Crown; it will be shorter, and it will *bring the* line near the beach, where there is less danger of *sand drift.* It will take the railway into Port Germein. The surveyed route is through farm lands, which, when fallowed, are liable to sand drift. There is provision at *Port Germein for* a siding on sections 206 and 208, at

the rear of the institute. The railway would then be within 30 or 40 chains of the wharf. The following is a copy of a letter sent to Mr. McHugh, M.P., by the Secretary for Lands, Mr. Messens, under date 12th August, 1925:—

> Referring to your inquiry relative to land reserved for railway purposes near Port Germein, I have to intimate that, in 1881, a number of suburban sections were withdrawn from offer when a railway from Port Germein to Orroroo was proposed, but since then the sections referred to have been sold, with the exception of numbers 206 and 208, adjoining the park lands north of the town. All the Crown lands surburban to Port Germein were withheld or withdrawn in January, 1916, in connexion with the proposed Long Plains to Port Augusta railway, but some of them have since been offered with a condition reserving the right to resume any land required for railways, &c., without compensation. Most of these sections are still Crown lands, including sections 206 and 208.

The population of Port Germein is between 200 and 250. The average area of holdings between Port Pirie and Port Germein is about 500 acres. If the Commonwealth survey is adhered to, farmers whose holdings are interfered with will suffer, although they will receive compensation. The fact that there will be a siding nearer to them than on the suggested deviation will not be of much consequence. A petition, advocating the route I have outlined, was signed practically by all the land-holders. There are only about four holdings on the surveyed route that will not have to be subdivided. Our experience is that land along the coastal route is not so much subject to sand drift as the open lands further back.

105. *To Mr. Lacey.*—If the 4-ft. 8½-in. line goes into Port Pirie, we expect to get a considerable amount of holiday traffic at Port Germein. A fair amount of cream is sent from our district to Port Pirie. The people further east also signed the petition in favour of the alternative route. The Commonwealth survey passes about 2 miles from Port Germein. Our proposal will take the line 1½ miles nearer that township. About fifteen farms will have to be subdivided on the surveyed route, and as there will be paddocks lying fallow on both sides of the line, there will be danger of sand drift in windy weather.

106. *To Mr. McGrath.*—The route we suggest is shorter by about 2 miles. Our main productions are wheat and wool.

107. *To Mr. Seabrook.*—I understand that there will be a number of cuttings 5 feet or 6 feet deep on the surveyed route, and the tendency there will be for sand to drift and cover the line. The route we are advocating is fairly close to the swamp, and there should be no danger of sand drift except with an east wind, and the prevailing winds do not come from that quarter. On the surveyed route, there will be danger of sand drift from both sides. I understand it is intended to have a station 2 miles out on the Gorge-road. That is not a suitable site. There is room nearer the jetty on land that has been reserved for a station site. Already there is a considerable amount of holiday traffic at Port Germein. On 28th December we had 1,500 people there, and on New Years Day there were about 3,000. Practically all the wheat grown in the district is shipped from this port, and it is possible that some additional trade will come here from the east-west line. Nearly all the land along the coast route is held by the Crown. Two blocks are owned by Mr. Von Ow, two sections by the District Council, and one by Mr. Williams.

The witness withdrew.

Daniel Turner, farmer, Port Germein, sworn and examined.

108. *To the Chairman.*—I own blocks 2 and 9 on the surveyed route. The line will run alongside No. 2 and across No. 9, cutting off about 20 acres. It will leave me with a three-cornered piece of land not sufficiently large to make another paddock. My No. 9 block is subdivided into five paddocks. I have refused £9 an acre for my land. I favour the beach route, because the survey passes too close to my homestead, and actually touches my sheds. The owners of land alongside the survey also favour the beach route. At present they cart their wheat either to Port Germein or to Port Pirie. Once wheat is on the wagon, a mile or two extra does not make much difference. Even if a siding is put in, I think wheat will still be carted to Port Germein to save the extra handling. My principal objection to the surveyed route is that it brings the line too close to my house. I do not know of any farmers who refused to sign the petition. There will be less danger of sand drift on the beach route.

109. *To Mr. McGrath.*—It will be fair to assume that if farmers who live near the surveyed route were objecting to this alternative route, they would be here to-day to give evidence. They are not here.

110. *To Mr. Lacey.*—If the railway follows the Commonwealth survey, my farm property will be an awkward size. I shall have to remove a good deal of fencing to make the necessary re-adjustment.

111. *To Mr. Seabrook.*—I am of the opinion that a railway line going through a man's property decreases its value. Other farmers in this district agree with me.

112. *To the Chairman.*—I hold 900 acres, and as I have sons to provide for I have not enough land. I shall lose about 25 to 30 acres.

The witness withdrew.

Eric Mattinson Willington, clerk of the District Council of Port Germein, sworn and examined.

113. *To the Chairman.*—The area of my council district is 517,760 acres. There will be no town allotments to be resumed on the surveyed route. I cannot say how many suburban allotments will have to be resumed, but in the area of the proposed line there are about 60 suburban allotments. About nine-tenths of them are held under freehold, and one-tenth are leasehold or Crown lands. These suburban lots are valued at about from £7 to £8 an acre. They vary in size from about 3 acres to 7 acres, and the average assessment is about £5. The population of the town and suburbs is between 250 and 300. The proposed deviation would be an advantage to Port Germein, because it would attract a good deal of tourist traffic to this town, and also lead to an increase in trade. I do not think there is any possibility of the Harbours' Board declining to maintain two ports in proximity to each other, like Port Germein and Port Pirie. Port Germein will always maintain its position against Port Pirie as a wheat-shipping centre. The council has experienced a great deal of difficulty with sand drift along the surveyed route. There is more risk of trouble there than on the beach route. Most of the trouble is caused by easterly winds from the hills, and along the beach route the scrub offers a good protection.

114. *To Mr. Lacey.*—In order to prevent sand drifting, the council recently issued an order to one landholder prohibiting him from cropping, or disturbing by grazing, ½ mile or 1 mile of his property for a period of three years. If land adjacent to the road is not cultivated, there is no danger of sand drift. Land along the proposed deviation will not be under cultivation, and therefore there should be no trouble with sand. The township blocks which might be affected by the alternative route are of little value.

115. *To the Chairman.*—From an engineering point of view, I do not think there is much to choose between the two routes. There is one big creek to cross. On the surveyed route it is more difficult than it is closer to the beach.

116. *To Senator Reid.*—Port Germein serves the Hundreds of Baroota and Telowie, comprising about 100 square miles, not including the hills. In my opinion, the port will always be able to compete with the railway for wheat traffic. When we get the railway, we shall be able to compete on equal terms with Port Pirie.

The witness withdrew.

Priestly Hillam, farmer and grazier, Baroota, sworn and examined.

117. *To the Chairman.*—I have been in the district for 48 years engaged in wheat growing and sheep raising. My property is 10 miles from Port Germein, in a northerly direction. I have been over the proposed route. I favour the lower route, because it is shorter and there is less risk of sand drifting. There have been two surveys. We all want to work for our town, and so we all want the line to be closer in. In my opinion, the railway will depreciate the value of any land that is cut up by £2 an acre. The suburban lands are not of much value. There is no demand for those blocks, and they could be bought, I think, for £1 an acre along the beach track. I have a couple of blocks in the township that I would not mind giving away for the cost of the transfer. They are of no value at the present time. The prevailing wind is from the south-west, although we get fairly strong gully winds from the east occasionally. There is more danger of sand drift along the surveyed route. Wheat is carted 18 miles to Port Germein from the north and east, and from the south for a distance of about 7 miles. As a practical farmer, I would say that, if I were 12 miles from Port Germein, and if there were a railway siding within 4 miles, I would send my wheat over the line. Usually the price at Port Pirie is 1d. a bushel better than at Port Germein. Very rarely is it 1d. higher. I would rather ship wheat from this port than from Port Pirie, because we have a good port here, and if we had railway connexion it would develop. A tramway extension from a railway along the surveyed route would not be of much assistance to Port Germein. If a line followed the coast route, it would be within a few hundred yards of the jetty, and if we had 4 ft. 8½ in rails on the wharf, we could truck our produce straight into the ships. The line would also develop a considerable amount of holiday traffic at Telowie and Port Germein. We have a very good beach here, so I think most of the people in Port Pirie would come on to this place. Vested interests in Port Pirie have kept Port Germein back.

118-9. *To Mr. Lacey.*—The motor mail and passenger service between Port Germein and Port Pirie is fairly well patronized. This is an early district for fattening stock. If we had the railway, we would have a good outlet at Port Pirie. Many farmers do not care to send their fat sheep and lambs to market owing to the distance and the absence of railway facilities. I believe that the railway will induce many stock-owners to raise fat lambs for the Adelaide market. Farm lands in this district will depreciate £2 an acre in value if they have to be subdivided to make way for the railway. White ants will also be more troublesome along the surveyed route than on the swampy lands nearer the coast. At all events, that is our experience in connexion with timber for fencing.

120. *To Mr. Seabrook.*—Stock raising on the country to the north of my place will probably be developed with the railway line.

121. If we had the railway we could send a considerable amount of hay that is grown in the district northwards in time of drought.

The witness withdrew.

Albert Percy Blesing, farmer and grazier, Bangor, sworn and examined.

122. *To the Chairman.*—My farm is 14 miles to the east, in the Flinders Range, and about ½ mile from Bangor, at the head of the Port Germein Gorge. I have a good road into Port Germein. I will use the railway for my produce. My wheat is all shipped from Port Germein. If I were living in the hills midway between Port Germein and Port Pirie I would still favour the coastal deviation, because it would not cut through so many valuable farm properties, and would develop a considerable amount of tourist traffic. Our sea beach is patronized extensively. It would be more in favour if we had railway facilities. The line will stimulate trade and increase population. A considerable amount of wool is grown in the district. Most of it is shipped at Port Germein, but when the railway comes through it will depend upon freight charges whether it goes through Germein or on to Adelaide. This is an early district. In normal seasons it is one of the finest grazing areas in the State, producing splendid fat stock, but owing to the distance from market and the conditions under which stock have to travel, the business has not been developed properly. The district is capable of much greater production. At present, lambs intended for freezing cannot be landed in Adelaide in good condition. The average size of the holdings is about 900 acres. In most cases, a farm a mile square is necessary, unless there is an ample water supply to make intense cultivation possible. A man with 1,000 acres could go in for mixed farming.

123. *To Mr. Lacey.*—Firewood supplies for Port Pirie are obtained from the foothills of the Flinders Range, on the eastern side. It is taken down the Wilmington line through Gladstone to Port Pirie. When this railway is built, many thousands of tons of wood will be carted through the gorge and trucked to Port Pirie from Port Germein. A considerable quantity of fruit is also grown on the western slopes of Flinders Range. Most of this goes to Port Pirie. Port Germein is a good port. The South Australian Harbours board states that the jetty at Port Germein is 2,455 feet long and has berthing accommodation for three vessels with a depth at low water of 23 feet, with an additional loading berth up to 17 feet at low water. I have been here frequently in the summer months, and have noticed a large number of tents erected by holiday makers on the beach.

124. *To Senator Reid.*—Land along the beach frontage is not expensive, so the cost of erecting summer residences should not be very great. The beach is convenient and safe.

The witness withdrew.

Edgar Claude Alford, farmer, Port Germein, sworn and examined.

125. *To the Chairman.* The building of the railway will have an important influence on Port Germein, but farms that will be cut up by the line will be reduced in value. The beach route, which we favour, traverses a considerable area of Crown land, which will cost the Government practically nothing. I think that route ought to be adopted if there are no engineering difficulties. Last year, we shipped 29,000 bags at Port Germein, and this year 34,000 bags. I have seen as much as 80,000 bags awaiting shipment at this port. In the busy season of the year, Port Germein should relive the congestion at Port Pirie. I have it on the authority of certain wheat merchants that when the railway is built wheat will come to Port Germein, from as far down as Snow town, for shipment here when there is undue congestion at Port Pirie. I have seen as many as six vessels lying at the anchorage for about ten days waiting to get into Port Pirie. In such circumstances,

Port Germein, if linked up by the railway, will act as an outer harbour for Port Pirie. The largest vessel we loaded here was the *Queen Elizabeth*, which took 90,161 bags of wheat, and was drawing 21 ft. 10 in. when she left the wharf. There have been as many as three vessels loading here at one time. The largest vessel that has been here was a ship of 7,000 tons, but there is enough water to take a 12,000-ton vessel. The jetty is under the control of the Harbours Board, with a harbour master in charge. Our port dues are the same as at other ports. The rise and fall of the tide is 8 feet, so we have a depth at full tide of 31 feet at the wharf. The harbour was dredged 30 years ago. It has not been touched since, and still the channel, 800 feet long, has 40 feet of water. Experience has proved that it will never silt up. The jetty is in very good serviceable order, and will carry an engine weighing 17 tons. The railway will be an advantage to Port Germein, but the station should not be 1½ miles from the town. The surveyed station site is subject to floods from the Back Creek gorge. In wet weather a great deal of water comes down the gorge and covers the station site. The land reserved for a station at the rear of the institute is higher, and not subject to floods. The citizens would not object to the park lands being used for railway purposes. No other part of the town is subject to floods since the District Council put the embankment outside the town.

126. *To Mr. Cook.*—Port Pirie should never have been an overseas shipping port. We have deep water here, and good natural facilities for loading overseas vessels. Farmers with fat stock will use the railway for the Adelaide market. At present, we have to travel fat stock 30 miles, and fat lambs lose their bloom before they reach the market. Port Germein is the earliest district in Australia for vegetables. We supply tomatoes for the Melbourne market two months before any other district. Representatives of auctioneering firms have assured me that, as soon as the line is commenced, they will establish a market at Port Germein. It has been stated officially that, if the wharf is extended 800 feet towards Cockles Bay, there will be 40 feet of water for overseas ships.

(Taken at Port Augusta.)

SATURDAY, 20TH FEBRUARY, 1926.

Present:

Mr. MACKAY, Chairman,

Senator Barnes	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

George Alfred Gahan, Chief Mechanical Engineer, Commonwealth Railways, Port Augusta, sworn and examined.

127. *To the Chairman.*—It is proposed to lay a third rail on the 3-ft 6-in line between Port Augusta and Stirling. We do not anticipate any difficulty over that section from a locomotive point of view. The mechanical engineers give the axle load of the locomotives and the stresses are run out by the civil engineering branch. I cannot say definitely how the estimate of saving in time on the through journey has been made out. There will be a saving of 70 miles over the proposed new route. The distance to Adelaide over the existing line is 260 miles. Trains from the west arrive here at 6.35 and passengers leave again at 8.27. Most of the time is taken up in transferring goods and passengers from the Commonwealth train to the narrow-gauge line. At Terowie, where the transfer is made to the 5-ft. 3-in. gauge, there is an average delay of three-quarters of an hour. I think these delays were taken into account when making an estimate of the saving in time on through journeys. I do not think there is much in the argument that the speed of the trains will be increased. Our east-west line is partly unballasted, and we are working it up to the speed limit allowed with safety. I take it, therefore, that the principal saving in time will be in connexion with the transfer of goods and passengers where the breaks of gauges occur and the shorter run to Adelaide. The additional rolling-stock required for the new line is estimated to cost £104,250. It will consist of three corridor, sitting-up passenger coaches, for wayside passengers between here and Adelaide, costing £19,500; three rail motor coaches, to seat 80 first class and 60 second class passengers, £30,000; four goods brake vans, £10,000; five covered trailers, for parcels, to be attached to rail motors, £4,750; and 50 cattle wagons, £40,000. We have the locomotives already. We work our locomotives between Port Augusta and Kalgoorlie, a distance of 1,051 miles. Our longest locomotive run is 303 miles, so the average is about 260 miles. When I was employed on the section between Melbourne and Albury in Victoria, we used to run our locomotive from North Melbourne to Seymour—60 miles—and have another engine to Benalla, and another to Albury. The length of run is determined by the capacity of the tender without re-coaling. The Commonwealth Railways is entitled to the credit for having introduced the long locomotive runs in Australia. What is known as the Princes car—80 feet over all, and the biggest in the British Empire—was built at our Port Augusta workshops. Our practice, except in regard to car building, is to call tenders for all our requirements. We build all our cars here. The railway cuttings between here and Quorn limit the loading, so cars built elsewhere have to be taken to pieces, shipped to Port Augusta, and re-assembled. Our practice is to prepare drawings and estimates for rolling-stock and call for tenders. Mr. Bell, our Railways Commissioner, asked for recommendations with regard to tenders for the new rolling-stock on this new line, which was to call for tenders. Accordingly Mr. Bell decided to call tenders for all the vehicles except the cars. I had experience with rail motors in France for about eighteen months. I knew of the McKean rail motors in Victoria sixteen years ago, but they have been improved out of all knowledge since then. In Canada they have established the world's record non-stop run of 2,900 miles, beating the overland express by seventeen hours with an average speed of 40 miles an hour. We shall not require extra accommodation or extra staff for the railway motors and trailers which we propose to utilize on this line, but the mechanical staff will be increased, and consequently we shall have to get extra housing. We have had no serious trouble with sand drift on the east-west line, and I do not think we shall have trouble on the proposed line to Port Pirie. Apart from Port Augusta, I have had no experience with the third rail. We have the mixed gauges on the wharf and in the construction yards here. At the beginning we had trouble, but we devised a switch which overcame our difficulty. The mixed gauges are now worked on the wharf with perfect safety, and I have no doubt that the third rail will be quite satisfactory between Red Hill and Adelaide. Though I have had little actual experience with the third rail, I have studied the problem, and I read the report of the royal commission appointed to inquire into the unification of the gauges. On the east-west line we experienced great difficulty in connexion with the water supply, which is unsuitable for engine use. Though we had a water treatment system, our boilers have not one-third of the average life of a boiler elsewhere in Australia. We have to replace them every seven years. We have eleven reservoirs, as well as a number of bores and wells, between here and Kalgoorlie. The water in the reservoirs is good enough, but, unfortunately, we have to use water from the bores and wells. The water between here and Red Hill is satisfactory for engine purposes. We could run from here to Red Hill without replenishing. We use

50 gallons to the mile, and our tenders carry 4,500 gallons.

128. *To Mr. Lacey.*—We estimate that 50 cattle trucks will be required for the traffic from the great northern line. The building of the railway to Red Hill will absorb some of the surplus engines at Port Augusta.

129. *To Senator Barnes.*—The average speed of our trains between here and Kalgoorlie is 31 miles an hour, and the average speed between Port Augusta and Terowie, on the narrow-gauge line, is about 22 miles an hour; so the saving of time due to the shorter run to Red Hill from Port Augusta, and the higher average speed over the 4-ft. 8½-in. line, will contribute materially to the estimated saving, on the through journey, of nine and a half hours. We are ballasting all the time on the east-west line. When the work is completed we expect to get an average speed of 45 miles an hour. We have fourteen narrow-gauge engines, built at Thompson's Foundry at Castlemaine, Victoria. Patterns are a most expensive item in locomotive construction. Possibly we could have engines built for us at the Newport workshops, where there is a fine plant.

130. *To Mr. Seabrook.*—In my opinion, the third rail proposal is perfectly safe. There need be no serious difficulty at the points. The mixing of 4-ft. 8½-in. and 5-ft. 3-in. gauges is quite as safe as the mixing of 3-ft. 6-in. and the 5-ft. 3-in. lines. It does not necessarily follow that the lesser clearance between the former as compared with the latter means added risk. Our regulations provide that speed through all station yards and past all sidings shall be reduced to 20 miles an hour, so I see no danger at all in the use of the third rail. Speed is an important factor in the safe working of a line. We have 40-ton, 15-ton, and 12-ton trucks, and we work up to about 80 per cent. loading in each class of truck. In our ballasting operations on the east-west line we limit our lead for ballast to 100 miles on each side of a quarry. I cannot say how close the sidings will be on the railway to Red Hill. Our east-west passenger trains do not carry freight, but frequently we take a couple of trucks of horses or sheep as through traffic. We could overcome the water difficulty on the east-west line with condensers, and already we have had quotations for a condensing plant, but there is every possibility of important developments in the construction of Diesel electrical locomotives, and we are delaying ordering condensing plants, which are very costly. The cost of a boiler is about £2,000 by the time it is put into the frame. We are working 40 locomotives over the line. It would pay to put in condensing plants, but our commissioner is searching the world for the most modern locomotive practice, and is hesitating spending money on condensing plants pending the development of Diesel electric locomotives. We shall, of course, require more than one condensing plant. Most of the timber for cars built at Port Augusta comes from Tasmania. We use all Australian material except a small quantity of oregon. We call tenders all over Australia for our rolling-stock, prices to be based on the landed cost at Port Augusta. Freight from Sydney or Newcastle would be about £5 a ton. As a 15-ton truck is equal to about 40 tons measurement for shipping purposes, the freight works out at about £200. Approximately it costs about £50 to re-assemble a carriage—Port Augusta. Some time ago we called tenders for sixteen wagons for the Northern Territory railway system, and received quotations from New South Wales and South Australia. S. Perry, Adelaide, got the contract. We claim that having all the necessary plant for car building we can do the work more satisfactorily and as cheaply in Port Augusta as anywhere else.

131. *To Senator Reid.*—Travellers complain about the long journey to Adelaide via Terowie. After three hours in the train the passenger at Carrieton is as far north from Adelaide as he was when he left Port Augusta. From a locomotive point of view, I know of no objection to the third rail proposal between Port Augusta and Adelaide. It means a little more work, but not necessarily more risk. Everything depends on the mechanism used at the points. In addition to saving time now lost owing to the breaks of gauge, the delays at refreshment rooms could be eliminated as passengers would get their meals on the train. Possibly there will still be a long delay at Kalgoorlie. This will be a matter for the Western Australia Government to attend to. Several of our reservoirs on the east-west line are covered to prevent evaporation. There is a loss of 8 feet a year through evaporation. The water from bores is the worst for our engines. We claim that cars built in our workshops are better than vehicles manufactured under contract.

132. *To Mr. Cook.*—I approve of the present route. In my opinion there will be more risk of sand drift on the coast route, and I believe we can get a better track and have lower maintenance costs on the surveyed route. The water from wells and bores on the east-west line is the worst in the world for engine purposes. The nearest approach to it is water used on certain private railways in South America. Some time ago we sent samples of our water to America for analysis, and were advised that they would not handle it as it was so bad. We are now in touch with the manufacturers of the turbo-condenser locomotive in Sweden. We have been advised by Mr. R. Blake, who represents us in England, that this type of locomotive has been developed on a practical basis. We get good water from our reservoirs on the east-west line, and we have let a contract to duplicate the size of our dam at Wilgena, outside of Tarcoola.

133. *To Mr. McGrath.*—My opinion with regard to the proposed deviation between Port Augusta and Port Germein is not the opinion of an expert railway construction engineer, but I know the country, and I think there will be less sand drift on the surveyed route. We have 150 men employed in our workshops. For a number of years we have not had any cars built for us outside Port Augusta. There is no certainty that a private contractor will get the contract for the new rolling-stock. I am hoping that we will do the work in our workshops. The Prince's car, built here, is the finest car in Australia. The Prince informed me that, with the exception of a privately-owned car in the United States of America, it was the best he had ever ridden in. We have not approached Newport workshops with the idea of getting locomotives built there, but I understand that they can do the work more cheaply than any other establishment in Australia. There will be one train a day over the new line, and I estimate there will be 120 trains each way in twelve months to handle the goods and live stock. We shall also run a rail motor service through to Adelaide.

134. *To the Chairman.*—There have been floods at Stirling, near Port Augusta, but the railway line has never suffered. I consider the Commonwealth standard of construction equal to that of any other standard in Australia. I read in the newspapers a statement made by Mr. Webb, South Australian Railways Commissioner, concerning our standards. Mr. Webb has not been over our lines. Our standards and the spacing of the sleepers are quite equal to those on the 5 ft. 3-in line in this State. It is not necessary to strengthen the sleepers to carry a third rail.

135. *To Mr. Lacey.*—Up to the present we have ballasted approximately 600 miles of the east-west track, and our transcontinental trains are running to the speed limit. We are hoping that with the construction of the line to Red Hill we shall get more passenger traffic and be able to run a train each day on the east-west line instead of, as at present, three trains a week.

136. *To Mr. Seabrook.*—Estimates of cost in connexion with car building are prepared by me. If

we consider tendor prices unsatisfactory, we carry out the work here. Within the last two years we have had approximately 160 vehicles built by S. Perry and Bagshaw in Adelaide.

The witness withdrew.

Keith Henderson Hunter, Mayor of Port Augusta, sworn and examined.

137. *To the Chairman.*—In my opinion direct communication with Adelaide via Red Hill will be an advantage to Port Augusta. I understand it will represent a saving in time of six hours to the journey. This will be an important consideration with stock-owners who desire to send stock to Adelaide. A considerable number of stock comes along the east-west line, and there is a possibility that our trade in wool will develop, especially in the north-west and along the route of the line from Oodnadatta to Alice Springs. I was hoping also that the line would give an impetus to the flour milling in Porth Augusta, but, unfortunately, our mill was burnt out last week, and it is doubtful if the industry will be re-established. It is possible that in the course of a few years the South Australian Government will construct a line from Kimba to Port Augusta. This would give residents of Eyre Peninsula a better means of communication with the rest of the State. The harbour at Port Augusta has been sadly neglected, but I am hoping that the Commonwealth Government will one day take a hand in its development The removal of the bar 4 miles down the gulf would enable us to accommodate the largest vessels that come into Australian waters. The Victorian Government has a special dredger for this class of work, but, unfortunately, it is required continuously in Victorian waters. There is a rise and fall in the tide of 12 feet at Port Augusta, but ship-owners are advised to load not deeper than 21 ft. 6 in. at the wharf. At present there is no shipping here. The wheat-growing areas in the north are fast dying out. Landholders are going in for mixed farming. Last year we shipped from Port Augusta 39,800 bags of wheat, and handled 4,500 bags at the mill. This year we have had only 20,000 bags. Wool production, on the other hand, is on the increase. Cattle stations on the east-west line are now being subdivided into sheep runs. The population of Port Augusta is 2,000, and of the district about 3,000. At present the town water supply is very unsatisfactory. The reservoir at Nector Brook, 24 miles out, is dry. Its holding capacity is 154,000,000 gallons. Woolundunga, our smaller reservoir, holds 7,000,000 gallons, and the Devonport dam, which it is proposed to line with concrete, holds 14,000,000 gallons. We are hoping that if we have a reasonable rainfall these smaller reservoirs will be kept supplied from springs in the Flinders Range. Other catchments, including Saltia and South Creeks, are also connected with our mains. A suggestion has been made that a weir should be put across the Saltia to increase its storage capacity. The rainfall last year was 6½ inches.

138. *To Mr. Lacey.*—Last year 50,000 bales of wool were shipped from Port Augusta by small vessels. The freight would be 5s. 6d. a bale. It is probable that the wool trade will develop appreciably with the construction of the line, because numerous stations are now being opened up in the north and north-west.

139. *To Mr. Seabrook.*—Port Augusta would suffer severely if the railway workshops were removed. The reduction in wheat production is due to the uncertainty of the seasons. The northern areas are outside Goyder's line of rainfall, so wheat farming in the north is a precarious occupation. Mixed farming is more in favour. We have a steamer service once a week between Adelaide and Port Augusta. Grocery lines all come by the steamer Rail freight for that class of goods, is more than 200 per cent. higher than steamer freights. I feel sure that the line to Red Hill will be a distinct advantage to Port Augusta and also to the country north-west of this town.

(Taken at Melbourne.)

TUESDAY, 2ND MARCH, 1926.

Present:

Mr. MACKAY, *Chairman*;

Senator Barnes	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.
Mr. Gregory	

Harold Winthrop Clapp, Chairman, Victorian Railways Commissioners, sworn and examined.

140. *To the Chairman.*—I am aware that the Commonwealth Parliament has referred to this Committee for investigation a proposal to extend the trans-Australian railway from Port Augusta to Red Hill, South Australia, and to lay a third rail to provide a railway of 4-ft. 8½-in. gauge on the South Australian 5-ft. 3-in. gauge railway between Red Hill and the Central Railway Station, Adelaide; and I understand that it is proposed to run over this section of mixed gauge track of 5-ft. 3-in. and 4-ft. 8½-in. gauges comparatively high-speed express and passenger trains, as well as goods and mixed trains. I take it that the primary purpose of construction is to operate the trans-Australian express direct between Kalgoorlie and Adelaide. I have no knowledge of any mixed gauge tracks of 4-ft. 8½-in. and 5-ft. 3-in. gauges. Mixed gauges are used to a very limited extent in some countries outside Australia. I have had a list prepared, from information we have available, showing the lines of mixed gauge in use throughout the world, which I now submit. This list shows that approximately 700 miles of mixed gauge track are, or have been, in use out of a total world's mileage of approximately 670,000 miles. Of course, I do not claim that this list is the actual total, but, as far as I can judge, it is approximately correct:—

RAILWAY SYSTEMS OPERATING MIXED GAUGE LINES WITH EITHER THIRD OR FOURTH RAIL.

	Gauge.	Mileage.
Germany.—West German Railway ..	Not stated ..	27
Belgium.—National Light Railway Company	3' 3" and 4' 8½"	41
France.—Alsace Lorraine Railway	Not stated ..	41
France.—French Southern	Not stated ..	93
France.—French Northern	3' 3" and 4' 8½"	6
France.—Paris-Lyons-Mediterranean .. (NOTE.—French State Railways are laying third and fourth rails on some lines of this Company).	3' 3" and 4' 8½"	5
France.—Paris-Orleans	Not stated ..	3
South America.—Argentine—Port of Buenos Ayres	3' 3" and 5' 6"	..
Brazil.—Central Brazil Railway ..	3' 3" and 5' 3"	73
Chili.—Seran Coquimbo, Antofagasta / Baquedano	3' 3" and 5' 6" / 3' 3" and 2' 6"	120
Denver.—Rio Grande	3' 6" and 4' 8½"	50
Canada.—Canadian Great Western for many years operated mixed gauge	3' 6" and 4' 8½"	87
Canada.—Prince Edward Island Railways also operated mixed gauge	3' 6" and 4' 8½"	60
Java.—Nederlandsche Indische Spoorweg Maatschappij	3' 3" and 5' 3"	37
India.—Bombay Baroda, North-Western Nizam, Oudh and Rohilkhund Railways	3' 3" and 5' 3"	76
Total	.. ..	660

I am not aware of any large mileage of mixed gauge railways in the United States of America. Certainly no line of major importance, similar in any way to the trans-Australian railway, is operated with mixed gauges. I do not know of any advantages claimed for the use of the third rail. The disadvantages of the third rail depend upon the extent to which it is proposed to install it. In short sections for special conditions, at junction

terminals or break-of-gauge systems, as at cattle yards or similar locations at such terminals, it may be of advantage, but any extensive installations for high-speed express traffic would increase the risk of accident. On the normal two-rail track there is comparatively small risk of derailments caused by obstructions on the line. The railhead presents a surface about 2⅞ inches wide, so that loading or parts of rolling-stock equipment dropping from the train rarely find lodgment on the railhead, but generally bounce or fall clear of the rail. This risk of derailment is infinitely greater in the case of the "third-rail," which presents a plane surface 9½ inches wide over the two railheads and flangeway, on which a very much greater percentage of obstructions dropped from trains would find lodgment than on a single railhead. Considerable additional risk would also be incurred by matter lodging in the flangeway between the two rails. It must not be assumed that the risk of derailments from obstructions on the ordinary normal track is negligible. An analysis of the causes of derailments on Victorian railways during the past five years shows no less than 102 instances in which the derailment is definitely known to have been caused by such obstructions. I have not searched the records to ascertain whether any have happened on the main lines, but there may have been one or two. I do not know of any that have happened at high speeds. My only direct information relating to a third rail is at Wodonga and Tocumwal. The third-rail system has been in use for many years at Wodonga—but not elsewhere in Victoria—where the "third rail" is laid to serve both 5-ft. 3-in. and 4-ft. 8½-in. gauges for a length of about 430 yards in the dead-end sidings adjoining the stockyards. The 4-ft. 8½-in. gauge track connecting the Wodonga stock sidings with the New South Wales system at Albury, after crossing and recrossing the Victorian 5-ft. 3-in gauge tracks in Wodonga station yards, runs parallel with the 5-ft. 3-in. gauge main line for a distance of about 3½ miles between Wodonga and Albury, the 4-ft. 8½-in. gauge track being carried on separate bridges over the River Murray, creeks, roads, &c., quite independently of the main 5-ft. 3-in. gauge tracks. At Tocumwal there is no mixed—third-rail—system in use on any main running line or important siding. A third rail is, however, provided on the 50-ft. turntable, and on about 47 lineal yards of the adjacent turntable siding. The third rail is also provided on about 142 lineal yards of Wise Bros. private flour mill siding. Otherwise, the whole of the New South Wales 4-ft. 8½-in. gauge and the Victorian 5-ft. 3-in. gauge main lines and sidings in Tocumwal yard are quite independent of each other, and were deliberately planned accordingly to the exclusion of the "third-rail" system. A plan showing the existing layout at Tocumwal is submitted to the Committee. It is, of course, realized that the operating conditions for a "third-rail" system in a dead-end shunting yard, as at Wodonga, with slow speed and under close supervision, are very different from those applicable to a main trunk line with high speed and under comparatively little supervision. I have no knowledge of any accident at any of the localities referred to. I am acquainted with the report of the Railways Commission on Uniform Gauge for Australia. The report of that Commission condemned the use of a third rail. The Commission states in its report that the installation of a third rail at cattle races or similar locations is approved. They are very simple affairs compared with the use of third-rail construction "over a material mileage of railway." Further, the appendix states that any time or money spent on a third rail would be wasted. My reading of the report is that it is a condemnation of the third rail generally, and a limitation of its range of useful ness to short sections of track at unimportant locations. I do not agree with Mr. Bell, Commonwealth Railways Commissioner, that the Commission on Uniform Gauge would alter its opinion in the light of present circumstances. I cannot admit that approval of the use of a third rail at cattle races or similar locations can possibly be construed into approval of a mixed gauge main line to carry high-speed express trains, or be given the construction suggested by Mr. Bell, namely, "that body recognized that a third rail would have to be used temporarily at various points during the conversion of existing lines to standard gauge." In the very exhaustive inquiries made by the Victorian Railways engineers, and in the complete organization, plans and estimates which were drafted for converting our 5-ft 3-in. gauge to 4 ft 8½ in., no use whatever was contemplated of a third rail at any stage of the conversion operations I do not agree with evidence placed before Committee, that it is only where stations with points and crossings and interlocking occur that any difficulty arises with the third rail. I consider there is appreciable additional risk of derailment between stations where high-speed trains are operated over mixed gauge lines. In speaking of mixed gauge lines I apply the term to 4-ft. 8½-in. and 5-ft. 3-in. lines. The presence of the third rail adds to the risk, therefore, also in points, crossings, and interlocking devices the additional risk is attendant. The cost of completely installing reliable points and crossings for a mixed gauge of 4 ft. 8½ in. and 5 ft. 3 in. would be prohibitive, and by "reliable" I do not mean the elimination of the additional risk. It would be much more simple to run 3-ft. 6-in. and 4-ft. 8½-in. trains over one track than to run 4-ft. 8½-in. and 5-ft. 3-in. trains over one track. There is no comparison between the difficulty of the two propositions. The inclusion of a third rail would not weaken the sleepers to any appreciable extent. On the Victorian railways we are using rail motors to a considerable extent. We have about 23 running, and one or two almost ready to go out. They are giving general satisfaction. They enable us to give a more frequent and more speedy service at less cost. There is a great disadvantage in carrying passengers on what we may call a peddling train—that is, a train that carries local goods. Such a means of transport is very annoying to passengers. I dream that some day we may entirely eliminate goods from passengers, and in any case I believe that we shall be able to do that very largely, if not entirely. It may surprise the Committee to learn that I have not ridden on the Commonwealth railways. I am very sorry for that, but I have had my nose very close to the grindstone. But from conversations with my engineers, I think that in every sense, including track and equipment, the Commonwealth railways are satisfactory Victorian railway officers have been sent to look at some of the Commonwealth equipment, so that we may be able to improve ours. I should strongly object to the use of a third rail on any considerable length of the Victorian railways. My feelings are so strong on that point that I could not discuss it decently with any one. I am stating my considered opinion. The Committee will, no doubt, meet persons who do not agree with me. I am quite open-minded about it The use of the third rail for 4-ft 8½-in and 5-ft. 3-in gauges would mean adding a risk that I would not want if I had to operate the system. I am speaking as a railway operator—a railway executive. In the final analysis the responsibility lies with the man at the head, and I speak as that man.

141. *To Senator Reid.*—I do not want to carry any more hazards in connexion with railway operations It is my considered opinion that the third rail for the two gauges contemplated brings in another risk that I do not want to sleep with when operating a railway for the public. If I had to make a recommendation, I would recommend the 4 ft. 8½ in. gauge line through to Adelaide. I am not considering what is payable, but I am viewing the thing from the point of view of the man who has to operate the line. It

would not "pay" to convert a foot of railway in Australia at the present time, and I say that, although I am a unificationist I want to see unification; but when I am asked the plain question, "Will it pay?" I assume that the question means, will the line earn sufficient to pay interest on the added investment necessitated by the change. It will not. I am not saying that the third rail could not be used on this line, but all I say is that I do not like the added risk. There would be only 3½ inches between the rails, and only 2½ inches clear at the fishplates. If it were up to me, and the powers that be would provide the money, I should not stop when I had constructed a 4-ft. 8½-in. gauge line to Adelaide, but would carry it right through from Perth to Brisbane. I want to see the unification of the gauges. No man in this business can be a true transport man unless he wants as complete fluidity as it is possible to attain in transport work. Victoria's portion of the cost of unifying the gauges will be more than £11,000,000. The Uniform Gauge Commission estimated that the cost to Victoria would be £11,000,000, but the Commission also stated that that estimate excluded interest on capital during the conversion period of five years, the cost of transfer stations, of which there would be a large number, and other charges, which I have not now before me. Whether I am speaking for the Commonwealth, or in my present capacity, I cannot change my step on this question—I am definitely against the twin gauge of 4 ft. 8½ in. and 5 ft. 3 in.

142. *To Mr. Seabrook.*—With 3-ft. 6-in. and 5-ft. 3-in. gauges on the same track, there would be a much greater space in the flange-way than with 4-ft. 8½-in. and 5-ft. 3-in. gauges. There is no doubt that there would be less risk in running round than through a station. I am endeavouring to state my views, not as a Victorian, but as an Australian. The flange of the wheels of one system would run in the flanged way, and the tread of the wheels of the other system would overlap the flange-way. If an obstruction were high enough to strike the tread of the wheels of the system whose tread overlaps the flange-way, it would not take much in the way of a hard obstruction to throw a train off the track. There would be an added risk in operating either gauge. The risk is a question of degree. The third rail might be laid down and operated for a considerable time without mishap.

143. *To Mr. Lacey.*—I have had experience of the third rail only at slow speeds through a city. We had some accidents which were largely due to the fact that we had to maintain the points and crossings to a closer adjustment. The two gauges were 4 ft. 8½ in. and 5 ft. 3 in. The speed was regulated. The width of the tread of the wheels of a train is considerably more than the width of the head of the rail, and, when travelling at a high speed, an engine floats across the track considerably over 1½ inches. The treads run over the head of the rail right up to the flanges. I fail to see how it is possible to construct a 4-ft. 8½-in. gauge line without having a break of gauge at the junctions with branch lines. I would not recommend a third rail in any circumstances. It has been explained to me very definitely that the object of the Port Augusta to Adelaide connexions is to get the transcontinental trains through to Adelaide without a change. If the Committee has taken my evidence as indicating that the 4-ft. 8½-in. gauge line should ruthlessly displace the South Australian 5-ft. 3-in. gauge line, I have been misunderstood. I say construct the Commonwealth 4-ft. 8½-in. gauge line through to Adelaide, if you are not ready to convert the rest of the South Australian lines. Of the rail motors in use in Victoria, we have about 19 or 20 of what are known as "A.E.C." They are 5-ton road chassis, built by the Associated Equipment Company of London. They originally had hard rubber tires. We removed the tires, and shrank on flanged steel tires. We cut the chassis through in the middle, and put in an additional 4 feet in length. We did not extend the unsupported length of the cardan shaft, and thus did not create an added torsion. We put on a body to carry about 36 passengers, and a small trailer to seat 24 or 28, with a light baggage compartment. We had to put in a light turntable on branch lines. That is a single-ended vehicle. For heavier work we have built a double-ended vehicle that seats 56 passengers, with a luggage compartment. We built that at our own works. The engine is a Leyland engine of 100 h.p., which we purchased in England. We have three of those vehicles running, and are building a fourth. They haul a trailer, too. We run them on such lines as Toolamba to Deniliquin, a distance of about 90 miles. They make good time. The average schedule speed for the small motors is 23 miles an hour, and for the large ones somewhat higher than 30 miles an hour.

144. *To Mr. Cook.*—In the Victorian railways we have had 102 derailments in five years due to obstructions on the track. The principal cause is obstructions on sidings during shuntings. Derailments are also caused by split points, and other things that happen from day to day. There may have been two instances of derailments at reasonable speeds. There have been instances of successful, as well as unsuccessful attempts to derail trains. A wedge of iron deliberately placed between a third rail and an outside rail would be a comparatively easy way to cause a derailment. It would be comparatively easy to deliberately derail a train running on a track equipped with a third rail. If I were asked what I should do if we were at war with another country, I should reply, "Lay third rails as fast as I could." When we are at war, we may do ruthless things, but I do not admit that to lay third rails would be ruthless.

145. *To Mr. Gregory.*—I was trained in the electrical engineering branch of railway work. On the present occasion, I do not speak as a civil engineer, but as a railway executive. In Great Britain, a variety of gauges was converted to 4 ft. 8½ in. The Great Western railway was transferred overnight. My recollection does not go back to those things, but I know that when the change was made, it was, in many instances, made during a week-end. I know of only one railway that ran a mixed gauge over any considerable length of line. I refer to the Denver-Rio Grande railway. When I was there, there were more than 50 miles so operated, but there are now only 50 miles, as far as I can ascertain. The 4-ft. 8½-in. gauge on that line carries a heavy express service. Speed trains cannot be run on a 3-ft. gauge. Such a gauge is getting down to a steam tramway basis. The 4-ft. 8½-in. gauge is considered the standard gauge of the world, but there are many miles of other gauges. If the Victorian rolling-stock were damaged in wartime, we should be hard put to it to replace it. All the knowledge I have leads me definitely to advocate unification in the real sense. Great Britain endeavoured to unify as soon as it could, and did it. I shall be very pleased to supply the Committee with operating data and construction costs of rail motors. The Committee can inspect the motors at any time. A small one is operating between Reservoir and Whittlesea. The nearest point at which a large one can be seen is Toolamba or Echuca. One is under construction in the workshops. On level lines we have regularly added a second trailer. The only risk is the liability to break the flexible leather or fibre coupling on the driving shaft. An extra one of these is carried in case of breakage. With two trailers the engine accelerates more slowly. This type of vehicle has assisted us greatly in many places.

(*Taken at Melbourne.*)

WEDNESDAY, 3rd MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.
Mr. Gregory	

Edward Simms, Secretary, Commonwealth Railways, sworn and examined.

146. *To the Chairman.*—The Royal Commission which, in 1921, investigated the question of unifying the railway gauges of Australia consisted of Mr. J. J. Garvan, chairman; Mr. F. M. Whyte, mechanical engineering expert; and Mr. Rustat Blake, civil engineering expert. Mr. Whyte was engaged from New York, and Mr. Blake from London. Mr. Garvan, the chairman, was not a railway expert, the idea being that the chairman of the Commission should have no association with any of the railway systems of Australia. I was secretary to the Commission, and filled that position for approximately twelve months. Mr. Garvan was not able to accompany the Commission throughout Australia, but he met the other members from time to time in Sydney. It was part of my duty to watch the investigations on certain lines on the chairman's behalf, but my position was really to fill the duties of a helper to the Commission. I did not take an active part in preparing matter for discussion. The Commissioners had their own ideas and their own methods of going to work, and they did the leading all the way. No evidence was taken on oath, consequently the complete evidence upon which the Commissioners based their recommendations is not available. The Commissioners kept very closely in touch with the various railway administrations of Australia, and had many reports from the railway engineers and others. They spent some time in each State investigating the system in operation. For instance, while they were in South Australia, they were practically in touch with the South Australian Commissioner and his officers for the whole of the time. After spending some time in South Australia, they returned to Melbourne, and if, as the result of their deliberations, they wished further information, it was obtained by correspondence. As a matter of fact, they visited South Australia four or five times. I merely mention that State as an example of the method followed by the Commission. I have a sheaf of correspondence but there was no evidence taken. Appendix 5, in the report of the Commission deals with question 5—"Whether a third rail or any mechanical device should be utilized; if so, what device, upon what sections and estimated cost." It does not relate to question 2—"What is necessary to be done in order to unify the gauges of the railway systems of Australia." I would not say that the Commission universally condemned the third rail for any purpose whatsoever. The Commissioners assumed that all the questions submitted to them were correlated. Therefore in dealing with question 5 they would be obliged to take into consideration the context. While I cannot, after a lapse of five years, say what was in their minds, to the best of my knowledge, they adopted the attitude that in formulating a scheme estimated to cost £21,600,000 to provide a connexion between the capital cities of Australia, and at the same time convert the broad-gauge systems of Victoria and South Australia, they asked themselves whether the third rail could be used in connexion with it, or whether it would be of advantage to make use of it. They were of opinion that while the work of connecting the various capitals by a standard gauge was in progress the third rail would be used here and there in order to facilitate operations, but they did not recommend that any section embraced in the £21,600,000 scheme should be laid with it. They understood that the Commonwealth would accept or reject their scheme for linking the capitals and converting the broad gauge lines of Victoria and South Australia. If it were accepted, it was their opinion that it would be useless to employ a third rail on any section as a permanent or semi-permanent arrangement, because when the gauge was converted to 4 ft. 8½ in., the rolling-stock to traverse the converted sections would also be converted. Therefore, with the rolling-stock converted a third rail on any part of the section would be useless. The Commissioners formed their conclusions on their own observations and on the knowledge of railway conditions in Australia they had gained, coupled with their knowledge of railway conditions abroad. To my mind, when they said that a third rail was of no value they had in mind the £21,600,000 scheme. The members of the Commission held a number of conferences, and when their investigations were nearly concluded Mr. Whyte, the American expert, undertook to write the report. He asked me to write one small section of it only for submission. When Mr. Whyte's report had been prepared he consulted with Mr. Blake regarding it. Mr. Garvan was not consulted regarding technical matters. So far as the third rail is concerned, I feel certain that they had no definite section in mind, but were considering its relation to the whole question. The section of the report which I was asked to prepare had no relation to the third rail idea. The report of the railway engineers of the Commonwealth and the States who met in conference in 1918 was taken into consideration by the Commissioners. My reading of paragraph (*e*) on page 9 of the report (C.16433) of the Commonwealth and State engineers is that, provided reliable points and crossings and suitable provision for accommodation of mixed-gauge trains were provided, the third-rail device would be safe and efficient The laying of a third rail would only permit of trucks of two gauges running on the line If, for instance, it was desired to convey bananas by rail from Brisbane to Melbourne, and the third-rail device were in operation between Brisbane and Albury, it would require four rails to enable the same rolling-stock to enter Melbourne. Although the third-rail device, with absolutely safe points and crossings, and suitable accommodation for mixed-gauge trains would provide for rolling-stock running on two different gauges only, the engineers said that it would not allow of the interchange of the rolling-stock used on the three gauges existing in Australia. In paragraph (*e*) of their report the engineers say that a multiple rail device, with absolutely reliable points and crossings, would enable rolling-stock of 4-ft. 8½-in. and 3-ft. 6-in. gauge to run over a 5-ft. 3-in. gauge railway, and that it would be perfectly safe to do so; but rolling-stock of 5-ft. 3-in. gauge could not run on narrower gauge systems because the sleepers would not be long enough nor the road bed sufficiently wide. Rolling-stock of 3-ft. 6-in. and 4-ft. 8½-in. gauge could run with safety over a 5-ft. 3-in. railway, but not vice versa. This matter of a third rail did not come up in connexion with the Royal Commission's proposed extension of the trans-Australian railway from Port Augusta to Adelaide. In their report, the Royal Commission recommended that a railway of standard gauge be provided between Port Augusta and Adelaide as part of the scheme of unification, which scheme was to cost £21,600,000 At that time the 5-ft 3-in gauge extended only to Lochiel. I do not know whether the statement in appendix 5, page 42, of the report of the

liberately sets out to derail trains could do it just as easily with the ordinary system as with the third-rail system. On the 2-ft. 6-in. and the metre gauge systems between Chile and Bolivia there is a mixed gauge. I do not know the class of traffic it handles, but it runs for 60 miles, and apparently gives satisfaction. It is a matter for the Railway Commissioners to insist on the use of effective points and crossings. Under the railway acts they are liable for the safe carriage of passengers, and no commissioner would schedule a passenger train over a line that he was satisfied was not right. I know the *system between Salisbury and Red Hill in South Australia*, I know the class of traffic it handles and the type of country it passes through, and I should say that there would be no risk in having the third rail on that section. I do not think that any commissioner would advocate the use of a third rail between Melbourne and Albury. I do not say that the third rail could be applied generally. I would not recommend it under any circumstances.

152. *To Senator Reid.*—Messrs. Whyte and Blake consulted with the various railway experts of the States. For twelve months they practically sat in the seats of the chief railway engineers of Australia, but they took no evidence. Some people called on them and asked to be heard on oath, but they would not take evidence. During the course of consultations very little mention was made of the use of a third rail in the transition stage. It was a matter that did not come up very much. Before Messrs. Whyte and Blake had been two months in Australia they made up their minds that our railways were in a bad position, and that a change must be made. They decided that Australia must face the question and make the change, and with that guiding thought in their minds they would not seriously entertain a third rail proposal. It would not be right for me to say what they might have done as a temporary arrangement between Port Augusta and Adelaide, because I do not remember it being definitely discussed, and I could not say definitely what was in their minds, but pending an agreement between the Commonwealth and the States, delayed on account of Victoria and New South Wales standing out of the agreement, I should say, *from my acquaintance with Messrs. Whyte and Blake extending* over about twelve months, that if they thought the adoption of a third rail between Red Hill and Adelaide would help in the transport of passengers across Australia they would advise putting down the third rail on that section for the time being, pending the uniform gauge being introduced. The Commonwealth having sent for them, and having agreed by resolution with the States to abide by their decision, I think these two engineers anticipated that when they had submitted their recommendation the Commonwealth would face the question seriously In their report they told us that the section between Port Augusta and Terowie was the worst in Australia, and that it should be corrected first. The proposal before the Committee will provide that correction temporarily. The line they recommended was one that should go down by Red Hill through Salisbury. I have no personal knowledge of India, or any of the other countries where the third rail is in use, but the 60-mile section in Chile is on a main line. I do not know the speed at which trains run over it, but if there are express trains between Chile and Bolivia they would run over it. In India the third rail is used on main lines for distances of 27, 26, and 17 miles, but I could not say that big expresses run over them. The third rail is in use on the main line in Australia from Bordertown to Servicetown. The distance is short, and the mixed gauges are 3 ft. 6 in. and 5 ft. 3 in.

(Taken at Melbourne.)

FRIDAY, 5TH MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Lynch	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Senbrook.

William Noah Hodges, Railway Contractor, sworn and examined.

153. *To the Chairman.*—For the greater part of my life I have been engaged in railway construction. In South Australia, nearly 40 years ago, I travelled over the Bordertown-Wolseley section of the Adelaide-Melbourne line, where a third rail was in operation. I *suppose I travelled over it hundreds of times*, but it was never in good order. It was recognized that a mistake had been made in laying it. In that case a 3-ft. 6-in. gauge line was placed inside a 5-ft. 3-in. line. Even greater difficulty would be experienced with a 4-ft. 8½-in. gauge line inside a 5-ft. 3-in line, because the inside flanges between the two rails would just about meet at the bottom, débris would be collected, and I doubt if there would be sufficient space for the driving of the dog spikes. It is almost impossible to keep such a line in good order, because the same load is carried on the single rail as on the other two. Any load will ride firmly on two points, but if the weight is distributed over three points you naturally have a rocking road. I am afraid that under the proposal now before the committee difficulty will be experienced in regard to platelaying and keeping the road in order. I advise the committee to procure a section of the two rails, and then the exact amount of space between them would be plainly seen. There are a number of complications that crop up. I know the route of the proposed railway very well, and I contend that there would be difficulty from the construction point of view. The country *between Port Pirie and Port Augusta is subject to* severe floods. Before it can be said that a third-rail device is satisfactory it must be proved that the railway authorities who have discarded it as a result of practical experience are fools, because wherever it has been tried it has been found a failure. In 1912 I visited Great Britain, Europe, the United States of America, and Canada. I travelled over 14,000 miles of railway in America, but I saw no other gauge than the 4 ft. 8½ in. Maintenance costs would be lower where a 3-ft. 6-in gauge was combined with a 5 ft. 3 in. than where a 4-ft. 8½-in. gauge was introduced. The minimum space required for a dog between the flanges of the two rails would be over an inch, but I doubt if there would be that space if the proposal before the committee were adopted. I certainly contend that there would be more than ordinary risk in adopting it, *because the gap* could be so easily filled with débris from a flood, with sand, or by a person maliciously placing some obstacle there that would switch a train off the track. Some engineers tell us that the difficulty with regard to spiking can be overcome by cutting notches in the flanges of the rail; but in this case such a proceeding would introduce *serious difficulties. Dogging* a sleeper twice instead of once would have a tendency to weaken it. If you insert a number of dogs in a sleeper the usefulness of that method is governed by the width of the sleeper. The inner side of a rail that is at 1 in 20 is lower to the extent of the depth of the adzing than the outer side of the other rail, so that in driving a dog to hold the outer rail it would probably become wood-bound on the lugs before it gripped the rail. This difficulty would be accentuated at crossings. Of course, anything can be done if you are prepared to pay for it. I suppose that on a through line it would

be possible to run around the stations, but I understand that the line in question will be a new one except where it will run through the old line. You inform me that the Railways Commissioner in South Australia (Mr. Webb) said that it would be possible to run through all stations; but, to my mind, that is not a practical method. If you were combining a 3-ft. 6-in. gauge with a 5-ft. 3-in. line I should say that that had been done before, and might be practicable. The third rail between Wolseley and Bordertown was not a success in regard to maintenance, and it was pulled up; but in the present case the difficulties are increased tenfold.

154. *To Mr. McGrath.*—I am told that in the United States of America the third rail has been taken up because it is regarded as unsatisfactory. On reference to the records it will be found that this device has been discarded wherever tried. In South Australia it was taken up years ago. When I took my trip abroad in 1912 I was a member of the House of Representatives, and I made numerous inquiries in connexion with the Port Augusta to Kalgoorlie line. I secured the passage of a motion through the House providing for the adoption of the standard coupling employed in the United States of America. I also advocated, on every possible occasion, the use of 80-lb rails, and my suggestion was eventually adopted. Although I have never taken the engineering course, I have gained, I hope, considerable experience as a railway contractor. I obtained my South Kensington certificate, which I received for various sorts of construction work, when I was twenty years of age. To my mind the best national route for this railway is through Hanson and along the River Murray. This would miss all the severe grades. At present the east-west line rises from sea level at Port Augusta and climbs a range of hills before it reaches Quorn. At Gumbowie it attains the highest point on the South Australian railway system, and then it returns to sea level at Adelaide. The Mt. Lofty ranges are climbed, and sea level is again reached at Murray Bridge. Mountainous country is again traversed in the neighbourhood of Ballarat, and steep grades are also negotiated between Melbourne and Sydney. If the railway followed the Murray valley these natural difficulties would be avoided, and great expense would be saved.

155. *To Mr. Lacey.*—I recommend the Port Augusta to Hay line via Hanson. I understood that the third rail between Bordertown and Wolseley had been taken up. If it is still there, it has not been used for many years. I have, on several occasions, seen trains derailed through sand drifting into the gap between the two rails. I do not know whether there is much drift of sand between Red Hill and Port Pirie. I was engaged in contract work at Port Pirie some 40 years ago, and I should not think that there would be much likelihood of sand drift between Port Pirie and Port Germein. You informed me that the South Australian Railways Commissioner stated, in evidence, that the third rail was working at Wolseley until about six months ago. It is like a fifth wheel of a coach; it was used simply because the Bordertown people were jealous over the express stopping at Wolseley. It is quite possible that the third rail is used in certain parts of the United States of America, but it is not regarded as proper railway practice. I should not adopt it, even as an expedient. I prefer to accept the opinion of the majority of engineers, who know what they were doing when they discarded it. You tell me that there is a space of 4 inches between the two rails, but I point out that the spiking is done at the foot of the rail and not at the head. The dog would require a space of over an inch, and I doubt whether the platelayer would find room to insert the tool employed in drawing the dogs. It seems to me that there would be hardly any space at all between the two rails at the bottom.

156. *To Mr. Gregory.*—The present tendency is to use heavier rails for fast traffic, and the heavier the rail the smaller would be the intervening space.

157. *To Senator Barnes.*—If a dog spike became loose you would not be able to bore a fresh hole wherever you wished, but you would require another slot in the rail. It might be possible to bolt the rails in position. Another point to remember is that the rails are not always rolled exactly true. The committee seems to assume that the adzing and rolling would be absolutely true. But in railway practice it is found that allowance has to be made for inaccuracies. The troubles that I have indicated could be best illustrated by means of a practical demonstration. The committee should obtain a short section of the rails, and also some of the dogs proposed to be used. I have nothing to gain or lose in connexion with this matter. I merely give my opinions in the interests of the country. I say, without hesitation, that, as a working proposition, the third rail involves great difficulties. It may appear to be satisfactory on paper, but in practice a number of troubles will present themselves.

158. *To Senator Lynch.*—The section between Wolseley and Bordertown measures between 7 to 10 miles. At first the contractor laid sand ballast, but the sand blew away as fast as he could put it there. The line was properly ballasted afterwards, and I think that the device received a fair trial. The time that a dog spike will hold depends on whether the sap is in the sleeper at the time it is driven. Moreover, a dog will hold longer with a heavy rail than with a light one. If the rail is too light the spike is drawn away from its hole. If you wish to bore a fresh hole, and have to cut a slot in the rail, the work will be complicated. The dog that particularly needs to be watched in connexion with a third rail proposal is the outside one. You can do with half as many dogs on the inside, but the outside rails must always be well dogged. Years ago, engineers in the United States of America thought that some magnetic influence was exerted upon rails running east and west, but the system of adzing and boring sleepers has been considerably altered in late years. At one time the adzing machines were made to bore the holes diagonally across the sleeper in parallel lines. Subsequently the machines were altered in order to bore the two inside holes leading and the outside holes at the back so that the two rails must remain true. I should not like to take the responsibility of laying a third rail between Port Augusta and Adelaide, having regard to public safety. Seeing that the east-west passengers must go over the 5-ft. 3-in. railway between Melbourne and Adelaide, what objection can there be to the 4-ft. 8½-in. gauge rolling-stock meeting the broader gauge rolling-stock at some given point, so that the necessity for the third rail would be eliminated? Only one transfer is required, and might it not take place at the point where the proposed new national route along the Murray Valley will be commenced?

159. *To Mr. Cook.*—My objection to the proposal is that it is dangerous, difficult to work, and expensive in upkeep.

160. *To Senator Reid.*—Its adoption would create undue wear both on the single rail and on the flanges of the wheels, because the single rail would be bound to sink.

161. *To Mr. Gregory.*—It is difficult to say what would be the average life of a sleeper on a line such as is proposed. Sleepers with four dog spikes close together would not last as long as a sleeper having only two.

162. *To Mr. Seabrook.*—In order to overcome the difficulty with regard to the narrow space between the two rails I suggest the use of a bolt that could be tightened with a box spanner from the inside. On the Metropolitan Railway, in England, years ago the dogs were all held by this means.

(*Taken at Adelaide.*)

SATURDAY, 6th MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Lynch	Mr. McGrath
Senator Reid	Mr. Seabrook.
Mr. Cook	

Charles Buxton Anderson, Acting Chief Engineer, South Australian Railways, sworn and examined.

163. *To the Chairman.*—I have no knowledge of mixed gauges outside Australia. Generally speaking, a third rail in connexion with the 4-ft. 8½-in. and 5-ft. 3-in. gauges presents no greater difficulties than it would in connexion with the 3-ft. 6-in. and 4-ft. 8½-in. gauges. In station yards, however, the conditions are somewhat different. The main line from Adelaide to Redhill is now laid with 80-lb. rails, but in the near future it is proposed to begin to lay all the main trunk lines in South Australia with 100-lb. rails. The section from Adelaide to Salisbury will be laid with 100-lb. rails. I do not know the date on which that work will be commenced, but it will be taken in hand very soon. The third rail between Adelaide and Salisbury will have to be 100 lb. to the yard; between Salisbury and Redhill 80-lb. rails would be used. The line from Redhill to Port Pirie, I understand, is to be a Commonwealth undertaking, although I believe that the third rail on that section is to be laid at the expense of South Australia. The distance between the flanges of the two rails would be ¾ inch in the case of 100-lb. rails. The dog spikes are ¾ inch in thickness. It would be possible to spike the 100-lb. rails if a third rail were used. The sleepers used in South Australia on broad-gauge lines are 8 ft. 6 in. in length, the section being 10 inches x 5 inches. Sleepers of that size are now laid between Redhill and Adelaide. It is not usual for the spikes to require attention for a long time after they have been driven into the sleepers. The necessity for new dog-spikes depends largely upon the life of the sleeper. The jarrah sleepers which are now used have a fairly long life. I anticipate no difficulty in connexion with the dog-spikes. They might not need attention for ten years; but that is a matter which depends upon the life of the sleeper. There would be no difficulty in lifting the dog-spikes should such action be rendered necessary. They could be lifted with a crowbar or a dog prizer, which has a short claw. I do not think that the third rail would upset the balance of the sleeper, or add materially to the cost of maintenance. There would, of course, be an additional rail to maintain. I have read some of the evidence to the effect that the two rails, being close together, might form a lodging place for débris, and thus constitute a danger; but I do not attach a great deal of importance to it. The check rails which are used on curves are closer to the main rail than the third rail would be. Check rails sometimes extend for half-a-mile on a curve. I have known of no derailments which have been caused by check rails. There have been comparatively few derailments from any cause in South Australia. Derailments are due to a variety of causes—errors in manipulating the points, defects in the rolling-stock or in the track itself, or an obstruction on the line. I do not anticipate any derailments because of anything falling off the trucks and lodging between the two rails. The extent of the danger would depend upon the nature of the obstruction. If it fell between the rails and projected above them, it would be struck by the life-guard or the cow-catcher. I do not consider that the third rail would cause more than the ordinary risk of derailment. While check rails are not used on all railway systems, they are used to a considerable extent. There will be no check rail on the curves between Adelaide and Redhill; they will not be necessary. The lines are inspected every day by a ganger. I am aware of the estimate for the laying of the third rail between Adelaide and Redhill, but I have seen no details which would enable me to form an opinion as to the reason for the difference between the Commonwealth estimate of £380,000 and the State estimate of £150,000. I shall endeavour to obtain details of the South Australian estimate. I do not think that the third rail would weaken the sleepers, nor do I think that any greater precautions would be necessary with the third rail than on the ordinary line. I have seen the plan of the route of the line between Redhill and Port Pirie, but I have seen no detailed drawings, and I do not know the length of the sleepers proposed. On the track to Redhill from Adelaide the sleepers are 8 ft. 6 in. in length. I am not aware of any long stretches of main line with a third rail in operation. In some of our station yards we have both 3-ft. 6-in. and 5-ft. 3-in. gauge lines. The Snowtown yard has both gauges. I consider that the sleepers on the railway between Redhill and Adelaide are sufficiently sound to take the third rail. I do not anticipate any early replacements, nor do I anticipate any constructional difficulties in laying the third rail. I see no reason to suggest any restriction on the speed of trains by reason of the laying of the third rail. In my opinion, the third rail is practicable and absolutely safe. Excluding the terminal stations, there are 24 stations between Adelaide and Redhill. None of those station-yards is very complicated. No great difficulty would be presented in bringing the mixed gauge into the Adelaide station. It is proposed to bring it in on the north side. I do not suggest mixing the Adelaide yard. I attach no special significance to the fact that, in an estimated length of 670,000 miles of railway throughout the world, there are only 700 miles of mixed gauge. I take it that only 700 miles of mixed gauge have been found necessary or expedient. I know of no other instance of the 4-ft. 8½-in. and 5-ft. 3-in. gauges being mixed. I presume that there has been no necessity to do so. Outside Australia the 5-ft. 3-in. gauge is comparatively rare. Of the 670,000 miles of railway in the world, 250,000 miles are in the United States of America. Those railways are of 4-ft. 8½-in. gauge. I have no knowledge of the circumstances which led to the railway authorities having only 430 yards of mixed gauge on the line between Wodonga and Albury, and therefore am unable to attach any special significance to the fact. I have not read the whole of the report of the Royal Commission on the uniform railway gauge. I have not read Appendix 5 on page 42 of that report, where the third rail is mentioned. Mr. Rushton and Mr. J. C. B. Mountrieff, who were members of the Break of Gauge Commission, which was appointed in 1918, and consisted of engineers from the States and the Commonwealth, are not now with the South Australian Railways Department. Mr. J. C. B. Mountrieff died some years ago. I have not seen the report of that Commission. I believe that a third rail could be usefully employed between Port Pirie and Adelaide, and that its use would not involve any undue risk. Drawings are in course of preparation for the points and crossings which will be necessary between Redhill and Adelaide. For the most part movable points will be used, but it will be necessary to have both fixed and movable points. Several years have passed since I saw the Port Augusta wharfs, where the third rail is in operation. I believe that fixed points are used there. So far as I remember, there was no movable blade. If properly constructed and maintained, points of that nature would be safe for fast traffic with the usual precautions. I shall be pleased to arrange a demonstration showing a small length of mixed gauge laid

with 80-lb. rails. The department has no 100-lb. rails available.

161. *To Mr. Lacey.*—The distance between the flanges of the two rails would be 1⅛ inch in the case of 80-lb. rails, and ⅞ inch in the case of 100-lb. rails. Between Adelaide and Salisbury 100-lb. rails would be used; for the remainder of the distance 80-lb. rails would be used. In spiking the rails the spikes are not placed opposite each other, but are staggered. It would not be possible to bore a sleeper six or eight times for spiking, as that would weaken it. The number of times that a sleeper could be re-spiked would depend upon its condition. It is rare for sleepers to be spiked more than three or four times. It would be possible to re-dog the sleepers on a mixed gauge as many times as the life of the sleeper would justify. There is sufficient room for spiking. I have had no experience of railways in the other States, and do not know whether guard rails are used extensively in Victoria. There are no guard rails on the line between Adelaide and Serviceton, except that we have guard rails at crossings and over bridges. Sometimes the flanges of the rails are slotted. On bridges there is sometimes only 2 inches between the main rail and the guard rail. The third rail is similar to a guard rail. I know of no instance in which a third rail has been taken up, excepting between Bordertown and Wolseley, where it was taken up because it was no longer required. The reason for its removal was not that it was inefficient. The plans of the points and crossings should be finished within a few weeks.

165. *To Senator Lynch.*—I have not considered connecting Port Augusta and Adelaide by means of a permanent transcontinental railway on the 4-ft. 8½-in. gauge. I have considered the proposal to lay a third rail between Redhill and Adelaide, and to construct a line of 4-ft. 8½-in. gauge between Port Augusta and Redhill to the extent only that it affects my own work. I have no opinion to offer regarding the best route for a railway between Port Augusta and Adelaide. I have not estimated the additional cost per mile to construct a line of standard gauge between Redhill and Adelaide instead of laying a third rail between those places. It costs about £10,000 per mile to construct a railway of 5 ft 3-in gauge, with 80-lb rails, on units similar to that between Adelaide and Redhill. As the estimate for the third rail is about £4,000 per mile the additional cost of a separate 4-ft. 8½-in. track for that distance—about 107 miles—would be, approximately, £600,000. While I do not regard the third rail as so ideal a job as a separate track, I should not hesitate in these special circumstances to use the third rail. From the point of view of public safety, I have no doubt as to the feasibility of the third rail, and do not think that it would render necessary a slower speed. It may be necessary to tighten the dog-spikes from time to time. That is frequently done, as it obviates boring fresh holes. I do not know the normal life of a jarrah sleeper in South Australia, as jarrah sleepers have not been generally used for any considerable period. The earlier lines were laid with red-gum sleepers, which, unfortunately, are not now obtainable. I should say that jarrah sleepers ought to last for 20 or 25 years. Red-gum sleepers have lasted for 30 years. Holes in the sleepers in which the dog spikes have worked loose are sometimes filled, and a new hole bored. That prolongs the life of the sleeper. It would not be possible to bore eight holes at one end of a sleeper for one rail. A sleeper in which the spikes worked loose to that extent would be better removed. It would be possible to bore four times for each of the rails at one end of a sleeper.

166. *To Mr. Cook.*—The cost of construction and of upkeep of a mixed gauge track can only be compared with two separate tracks, that being the only alternative to the laying of a third rail. The construction and maintenance of one rond-bed, with one set of sleepers and three rails, would not be so heavy as in the case of two separate tracks. The three rails could be as effectively packed as two rails, so long as the work was carefully done. I do not think that the fact that the sleeper would have one rail at one end, as against two rails at the other end, would cause it to rock. The sleepers would probably not last so long with three rails as with two, as there would be two dog-spikes between the rails, and they could only be shifted in straight lines. Having regard to the necessity for safe working, and irrespective of the cost of construction or maintenance, I see no reason why the third rail should not provide perfectly safe working.

167. *To Mr. Seabrook.*—With the two rails on one side so close together, there would not be three separate packings, but two only. With gauges of 5 ft. 3 in. and 3 ft. 6 in. there would be three packings. The tendency to rock would not be so great with 4ft. 8½-in. and 5-ft. 3-in. gauges as with 3-ft. 6-in. and 5-ft. 3-in. gauges. On the east-west railway 80-lb. rails are used. On that portion of the track between Adelaide and Salisbury, where 100-lb. rails will be used, the third rail would have to be of the same weight, because of the difference between the height of 100-lb. and 80-lb. rails. Base plates are used on curves. With two rails close together, one wide plate with holes punched in the proper position would be necessary. Near the points the switch-blades work on plates or chairs. They have to be longer than the usual base plates. I anticipate no danger at the points and crossings. I am unable to speak of the incidence of responsibility as between the State and the Commonwealth in the case of accidents on a mixed gauge line. The additional points which would be necessary to deal with freight traffic would not add to the risk incurred by Commonwealth trains. I do not anticipate any danger from débris getting between the rails as the result of floods, as after every flood the track is inspected before a train passes over it. I know of no break of gauge device which I consider satisfactory. I have not seen the device which provides for a wheel with two flanges.

168. *To Senator Reid.*—While I do not like to assume the rôle of a prophet, I regard the present proposal as an expedient to meet the particular needs of the moment pending unification of the gauges throughout the Commonwealth. The additional cost for rolling-stock in the event of the 4-ft. 8½-in. line being taken into Adelaide without any mixed gauge would possibly be considerable. I should not care to give an estimate of the amount. The only alternative to the third rail would be to lay a separate track of 4-ft. 8½-in. gauge railway from Redhill to Adelaide, which would mean heavy expenditure. The fact that the rail on one end of the sleeper would always be in use would not constitute a danger. It would, however, wear out more quickly than would either of the two rails at the other end of the sleeper. No additional packing of that rail would be necessary. The liability to derailment because of material falling from the trucks would not be increased by the adoption of a third rail. It is impossible to provide against obstructions being deliberately placed on the lines to cause derailment. The department keeps no record of the number of times that dog-spikes have to be driven in more tightly, or of the number of times that they are shifted. Those matters are left to the ganger, whose duty it is to maintain the lines in proper condition. I know instances of sleepers having had to be removed because of the number of dog-spike holes in them. They are sometimes taken up for other reasons. There is a possibility of more renewals of sleepers being necessary with three rails than with two rails.

169. *To the Chairman.*—The mixed gauge between Bordertown and Wolseley was laid down to enable the

3-ft. 6-in. rolling-stock to go to Bordertown. I do not think that the statement of one witness that that section was never in good order, and that the third rail was taken up because it was realized that a mistake had been made in laying it, is justified. The rail was removed because it was no longer needed. It was not removed because of any inherent faults. I have been over the route referred to in the agreement as far as Port Pirie. Various proposals for a deviation from that route have been advanced, but I do not know whether any has been adopted. I have not considered the question of route, as I understand that was a matter entirely for the Commonwealth. I do not think that there is much to choose between the routes. That marked in red on the plan, which was recommended by the Railways Standing Committee of South Australia, appears to go along a 3-chain road, which, from the point of view of compensation to land-owners, might have advantages. That line marked in blue on the plan—the line referred to in the agreement—is more direct. The nearer the line is taken to Port Pirie, the greater the convenience to that town, as it would enable passengers to reach there by the Commonwealth railway. The line shown in red on the plan goes more into the residential area surrounding Port Pirie than does the line marked in blue. It might, therefore, be more convenient to persons desiring to use the railway. It is questionable whether the greater convenience would warrant the cost of the deviation. I understand that the people of Wandearah wanted the line to go further west through the Hundred of Wandearah, but I am not in a position to give an opinion as to the relative merits of the routes, as I do not know the country in that hundred or to the south of Port Pirie. I do not know Munday's Gap.

170. *To Mr. Lacey.*—There would be no great engineering difficulties in bringing the line into Port Pirie, and taking it out again. It is more a question of compensation for land. Mr. Farmer will be able to give the Committee particulars of the various routes.

171. *To Mr. Seabrook.*—The sleepers on the South Australian broad-gauge lines are 10 inches x 5 inches, whereas the sleepers used by the Commonwealth are 9 inches x 4½ inches. I do not anticipate any trouble in adjusting the cost of the different sleepers. I do not know the cost of the Commonwealth sleepers. The price paid for the sleepers used by the South Australian railways fluctuates from time to time, but at present the sleepers cost 12s. each at our store.

(Taken at Adelaide.)

MONDAY, 8TH MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Lynch	Mr. McGrath
Senator Reid	Mr. Seabrook.
Mr. Cook	

James McGuire, South Australian Railways Commissioner, sworn and examined.

172. *To the Chairman.*—I am aware of the proposal to extend the 4-ft. 8½-in. gauge railway from Port Augusta to Red Hill and to lay a third rail between Red Hill and Adelaide as well as from Red Hill to Port Pirie. I was not consulted regarding the agreement between the Commonwealth and South Australia. The Chief Commissioner was consulted as to part of it. I am aware of the route which the State Railways Standing Committee in 1924 recommended for the line between Salisbury and Port Augusta. I do not know at whose instance the route was varied to tend further to the east at the 17-mile point from Red Hill, nor do I know why the route was altered. I know the country south of Port Pirie, but the country north of that town I do not know very well. There is very little difference between the two routes. The line recommended by the State Railways Standing Committee of 1924 would have served the people of Wandearah. I have seen the agreement between the State and the Commonwealth. The first idea was to have as direct a line as possible from Adelaide to Port Augusta. It was afterwards thought that it would be wise to make a deviation to bring the line nearer to Port Pirie. Later, the claims of Wandearah were considered. The country around Wandearah is good. The difference in mileage between the two lines is not great. From my knowledge of the country I should say that the Wandearah track would be the better one. It would not be possible to take the 4-ft. 8½-in. line nearer to Port Pirie than is proposed in the agreement without going right into the town. As the Commonwealth is concerned only with passenger traffic north of Port Pirie, I do not think that to take the 4-ft. 8½-in. gauge line nearer to Port Pirie would be of much advantage to that town. It might be of little advantage in the case of stock, but not in the case of passengers. Most of the stock which supplies Port Pirie with meat comes from the north. In view of the possible growth of the population of Port Pirie, I consider that stock-yards should not be placed nearer to the town than the site of the proposed station. I do not know the country in the vicinity of Munday's Gap or Cocky's Crossing, and can express no opinion regarding the proposal to deviate the line to take it nearer to the Wandearah State School. I do not consider that it is important that the line be taken to near the Wandearah State School in order to save the settlers in the locality a distance of from 1 to 3 miles in cartage to the station. I have no knowledge of mixed-gauge railways outside Australia. My railway experience has been confined to South Australia. From my reading and from information obtained from other sources, I am satisfied that the 5-ft. 3-in. and 4-ft. 8½-in. gauges would work together with safety. I do not apprehend any risk at points or crossings. I see no necessity to take the 4 ft. 8½-in. gauge line around the station yards. I do not know the reason that between Albury and Wodonga there is only 430 yards of mixed track and that for the remainder of the distance the 4-ft. 8½in. and 5ft. 3-in. lines run parallel. It may have been due to the nature of the country or to the fact of the line crossing watercourses. I do not consider that there is any greater danger in the case of a third rail with the 4-ft. 8½-in. and 5-ft. 3-in. gauges than if used in connexion with the 3-ft. 6-in. and 5-ft. 3-in. gauges, nor do I attach any special significance to the fact that in an estimated length of 670,000 miles of railway throughout the world there are approximately 700 miles only of mixed-gauge railways. To me those figures suggest that the railway engineers were able to overcome difficulties in other ways. I do not anticipate any risk with the third rail at points and crossings. I have no knowledge of the details of the State estimate of £450,000 or of the Commonwealth estimate of £380,000 for the third rail between Red Hill and Adelaide. Unless I examined the estimates I could not explain the difference between them. The South Australian standard is slightly higher than that of the Commonwealth. For instance, our sleepers are bigger, and cost more than the Commonwealth sleepers. That may account for some of the difference between the estimates, because it will be necessary to place some new sleepers on the line between Red Hill and Adelaide. At station yards new sleepers would be required, and also between main line and Abattoirs. I do not

know whether the Commonwealth estimate has taken that into consideration. Details of the South Australian estimate could be obtained from the Chief Commissioner. I could give no explanation of the difference between the estimates unless I had an opportunity of comparing them. The South Australian Railway Department intends to install automatic signalling between Adelaide and Red Hill whether the third rail is used or not. I am familiar with the country around Crystal Brook, but I do not know the Wandearah country so well. I have been to Port Germein. I do not consider that Crystal Brook, in view of the railway facilities which that town now enjoys, has any claim to this railway passing through it. I prefer the route referred to in the agreement to that through Crystal Brook. I do not anticipate any increased settlement because of the construction of this line. Most of the country along the route is already settled, although some is held in fairly large holdings. I do not anticipate any difficulty regarding water supplies for locomotives south of Port Pirie, nor do I expect that the danger from drifting sand would be greater on the proposed line than on the existing lines. I do not think that the third rail would increase the danger. I approve of the general scheme for the unification of the railway gauges of Australia. Between Adelaide and Red Hill there are three branch lines—one each from Snowtown, Salisbury, and Bowmans. They will all be 5-ft. 3-in. gauge soon, as the conversion of the narrow-gauge lines to 5 ft. 3 in. is nearly completed. Pending unification of the railway gauges of Australia, the proposal to lay a third rail on this section has been made. I do not anticipate any danger from the third rail. The traffic on this line would be light. Our switches will be interlocked. By the time the East-West traffic has developed to the extent that a third rail might prove to be dangerous, the gauges of the Commonwealth should have been made uniform. It would then be an easy matter to take up the outside rail; the 4-ft. 8½-in. gauge line would be already there. There are no tunnels between Red Hill and Adelaide, but there are some bridges, two fairly large ones being over the river Wakefield and the river Broughton. The difference between the weight of the South Australian locomotives now in use and those on the East-West line would probably not be more than 4 tons to the axle. Our new locomotives will, however, be much heavier; the bridges and culverts have been made strong enough to carry them. I do not know whether South Australia will bear a proportion of the cost of the longer and wider sleepers necessary between Red Hill and Port Pirie to carry the third rail. That is part of the estimate. I do not know whether the State will share the expense of resuming land. We have about 15 motor-rail cars in operation, and are getting more. They have given every satisfaction, and the running costs are low.

173. *To Senator Lynch.*—When South Australia constructed the line from Salisbury to Red Hill it had in view the ultimate connexion of Adelaide with Port Augusta. That line was constructed to be part of main transcontinental railway. I have never favoured the Crystal Brook route. In my opinion, the line should go nearer to Port Pirie. The Crystal Brook route would not take the line nearer than 8 miles to Port Pirie, and a branch line to Port Pirie would be required. I favour the line going close to Port Pirie. The route proposed by the agreement is, in my opinion, satisfactory. Should it be decided not to adopt the third rail, I should prefer that the transfer station be as far away from Adelaide as possible. In my opinion, it would be better at Port Augusta than nearer the city. But I do not consider that there is any danger in adopting the third rail in this instance. The traffic will not be heavy, the grade is easy, and there are no engineering difficulties with curves or tunnels. The third rail is not only the cheapest way in which to bring the 4-ft. 8½-in. gauge to Adelaide, but it is perfectly safe also. If a transfer station is necessary, the further it is kept from our front door the better. I consider that it would be unwise to bring the 4-ft. 8½-in. gauge line into Adelaide separately when, by adopting the third rail, the same result could be obtained at considerably less cost.

174. *To Mr. Cook.*—I consider that, apart from considerations of economy, it would be better to have a separate 4-ft. 8½-in. gauge line into Adelaide; but I do not anticipate any danger from the third rail. The three rails would be as safe as two rails. The additional cost of maintenance of a mixed gauge line would not be great. With the third rail in operation there would be no difficulty with the interlocking gear, or any additional risk of derailment. Whether a third rail is used or not, it is always easy to derail a train deliberately. There is nothing in connexion with the third rail which would tend to cause more derailments. There is no more danger of sand-drift with a third rail than there is now where the guard rail is used. We have many miles of guard rail in South Australia, and sometimes it is within 2 inches of the main rail. We have experienced no special trouble from sand-drifts because of the existence of the guard rail. It is all a matter of maintenance. We have had two or three nasty smashes because of débris falling off trains and causing derailments. I have known of a bag of chaff causing a derailment. That risk would not be greater with a third rail. In my opinion, the third rail would neither increase nor decrease the danger of derailment. At any time material falling from a truck constitutes a risk. I am satisfied that the risk is not increased by the third rail.

175. *To Mr. Seabrook.*—I do not know the Wandearah country, and, therefore, am unable to say whether a deviation into it would be of benefit to South Australia. I do not think that a deviation to Wandearah would increase the freight on the new line, because much of the wheat grown there is carted to Port Pirie, about 20 miles distant. It would depend on the market whether a farmer carted his wheat to Port Pirie or the shorter distance to the train. To some extent, it would depend on the location of his farm and the respective distances between it and either Port Pirie or the new station. The State might derive some little benefit from a deviation nearer to Wandearah. Some years ago there were sale-yards at Solomontown, but I do not know whether they are there still. I believe that most of the meat for Port Pirie comes from the Crystal Brook stock market. Although not a railway engineer, I do not anticipate any difficulty in dogging the rails, even at points and crossings. It should be possible to overcome any difficulties which present themselves. It is true that sleepers have already been laid between Adelaide and Red Hill; but additional sleepers would be required, and the timbers in the yards would have to be larger, to carry the additional switches. I consider that it would be safe to take the mixed gauge into the station yards on the route, that it would not be necessary to go around the yards. I am unable to say whether the repairing of engines, carriages, and rolling-stock could be done more cheaply at Adelaide than at Port Augusta.

176. *To Senator Barnes.*—The distance between the rail and the guard rail, where the latter is used, is 2 inches at the top of the rails. No trouble has been experienced in fixing the dog-spikes where the guard rail is used, and I do not anticipate that there would be difficulty in spiking the third rail. I could not express an opinion whether it would be possible to spike both rails with one spike.

177. *To Mr. McGrath.*—I am aware that many railway authorities are opposed to the third rail. I believe that there was a conference between Mr. Hobler, the Commonwealth engineer, and the South Australian engineer regarding the laying of a third rail between Port Pirie and Adelaide. I was not present at that conference. I think that the committee would be justified in believing that the officers of both departments consider the third rail to be safe. I understand that there was a conference between the officers of both departments regarding the cost of the third rail, but I was not present at it. The length of mixed-gauge lines between Bordertown and Wolseley was always in working order. We ran our engines over it until recently. I do not agree with Mr. Hedges that the third rail would render necessary special slots in thousands of rails, that the work would be exceedingly costly, or that there would be additional danger because of sand-drifts. The maintenance men are continually inspecting the lines. I consider that the third rail is perfectly safe.

178. *To Senator Reid.*—I know Port Pirie well. I do not think that whether the 4-ft. 8½-in. line enters Port Pirie or not that town will be much affected. The 5-ft. 3-in. gauge will enter Port Pirie. It would be possible to take the 4-ft. 8½-in. gauge line into Port Pirie and out again without backing the train; but that is a matter for the surveyors. They might not feel inclined to take the line right into Port Pirie on account of the swamps. I do not think that the Port Pirie people want three gauges in their town. So long as the 4-ft. 8½-in. gauge is not too far away, it would meet Port Pirie's requirements for passenger traffic. The cost of constructing railways in South Australia is approximately the same as the cost of Commonwealth railways. The only possible comparison is with the East-West railway, which cost between £6,000 and £7,000 a mile. The average cost of the South Australian railways is about £7,000 a mile These figures are exclusive of rolling-stock. The East-West line has not been fully ballasted, whereas the line from Adelaide to Red Hill is a first class one. I do not know whether that has anything to do with the difference between the estimates. I know of no accident which has been attributed to the presence of guard rails on bridges or crossings. I have known a guard rail to re-rail a truck. At Black Rock a bag of chaff derailed a truck which, after travelling for 3 miles, struck the guard rail and was re-railed. The line from Salisbury to Red Hill was constructed in sections. It was first taken to Long Plains, then to Snowtown, and later to Red Hill. The idea was to continue it until eventually Port Augusta was reached. The proposal covered by the agreement emanated from the Commonwealth. I should not adopt the third rail generally, but I have no objection to it on this section. The conditions between Adelaide and Red Hill are favorable for the third rail, which will give direct communication and quicker service than exists at present. I was referring to transfer work generally when I say that I favoured Port Augusta as a transfer station. The transfer in this case would be of mails, parcels, and passengers. Transfer work such as is carried out at Terowie and at Hamley Bridge is better performed as far from the city as possible. Railway travelling would have to be made very attractive to induce passengers to travel by rail rather than by the mail boats. The travelling public certainly regards the transfer from one carriage to another as a nuisance.

179. *To Mr. Lacey.*—I am well acquainted with the country between Red Hill and Port Pirie, and with Port Pirie itself. I know of no engineering difficulties which would prevent the line from being taken just below the Solomontown Railway Station, back through the station yard, around the brick kilns in Solomontown, and out to the surveyed road leading to Port Germein. The nearer to the river the line was taken the worse would be the swamps. If the 4-ft. 8½-in. gauge line were taken into Adelaide instead of adopting a third rail there would be a break of gauge at every junction with that line between Adelaide and Red Hill. If it were proposed to continue the Wilmington line to Port Augusta there would be very heavy constructional work through the Flinders Range. I have seen no report to the effect that it would be impossible to take a line of more than 3-ft. 6-in. gauge through the Pichi Richi Pass. There would be no difficulty in taking a 4-ft. 8½-in. gauge track through the pass, it need not necessarily follow the same track as the existing line. The grade through the pass is very heavy. The rail-motor cars used in South Australia are Brill cars, made in America. The cars which are now running came ready for the track, but the department is building its own bodies for the new cars which are required. If the line were taken to near the Wandearah East State School, which is about 18 miles from Port Pirie, I think that the farmers in the locality would prefer to deliver their wheat to the siding there than to take it to Port Pirie, a distance of approximately 20 miles, to obtain an extra farthing a bushel. I do not consider that there is any greater danger with a third rail uniting the 5-ft. 3-in. and 4-ft. 8½-in. gauges than one used to unite the 5-ft. 3-in. and 3-ft. 6-in. gauges. One lever would pull both blades with one operation. I do not think that there are any guard rails at Bowmans, where there is a sharp curve, or on any section between Adelaide and Red Hill. The question of guard rails complicating matters with the third rail in operation does not arise, as the department is not now using guard rails to any great extent. I do not know much about the country north of Crystal Brook on the Crystal Brook route, but I imagine that the Wandearah route would be better from an engineering point of view. I have been over the proposed route between Crystal Brook and Red Hill, but I have not been into the Wandearah country.

180. *To Senator Lynch.*—The automatic signalling apparatus is operated from the rail. It does not matter whether a 4-ft. 8½-in. or a 5-ft. 3-in. gauge train is on the line, that train holds the road.

The witness withdrew.

Mark Weston, agent and farmer, Crystal Brook, sworn and examined.

181. *To the Chairman.* I am aware of the nature of the inquiry, which is the construction of a 4 ft 8½-in railway from Red Hill to Port Augusta and the laying of a third rail from Red Hill to Adelaide and also from Red Hill to Port Pirie. I have seen a plan of the route which was suggested by the State Railways Standing Committee in 1924. I am aware that the agreement between the Commonwealth and the State provides that the route shall be as near as possible to that recommended by the State Railways Standing Committee. Two State committees have investigated the route for a line between Red Hill and Port Augusta. The Crystal Brook people were satisfied with the final report of the 1915 committee, and were so convinced that that was the correct route that they practically took no steps to place the claims of Crystal Brook before the new committee. The result was that a new committee, which was differently constituted, recommended the Wandearah route We contend that that alteration was due, not so much to the influence of Wandearah, as to pressure which was brought to bear by Port Pirie interests. We considered that it would be a great mistake for the Federal railway to miss Crystal Brook, seeing that at that town is situated the first stock market which stock from the north reach. Crystal Brook is also the largest wheat-receiving centre in the State. Apart from the Abattoirs

near Adelaide, the Crystal Brook stock market is the largest in the State. More fat cattle are dealt with there than in any other country town. Crystal Brook supplies the Port Pirie shipping and town trade with 75 per cent. of its meat, and one-half of the meat requirements of Wallaroo also. Thousands of tons of wheat are railed every year from Crystal Brook. More would be sent to Adelaide were it not for the break of gauge. The country surrounding Crystal Brook, Port Germein, and Port Pirie is the earliest wheat district in Australia. The grain ripens about the first week in November; sometimes in October. In 1915 we sent thousands of bags to Victoria during October. Any extension of the 5-ft. 3-in. line to Quorn would not pass through Crystal Brook. The population of Crystal Brook is about 2,300, but the district serves a much greater population. I realize that the proposal before the committee is for a through line, and that the Commonwealth cannot deal with freight south of Port Pirie. The bulk of the stock which now comes to the Crystal Brook market comes from the north, via Peterborough. The average number of fat cattle marketed at Crystal Brook is from 130 to 150 weekly. There is a market there four times a month. Cattle for Wallaroo are driven there from Crystal Brook after the sale. Although the previous Railways Standing Committee was in favour of the Crystal Brook route, with a change of government a new committee was appointed, and that decision was altered. Port Pirie could be reached as well by a line through Crystal Brook as by one through Wandearah. Previously, it was proposed to follow the present line past Warnertown to nearly the same place as it is now intended to cross the existing 3-ft. 6-in. line. The Crystal Brook people do not want to say anything against the construction of a line through Wandearah, but they contend that the line now proposed would not serve Wandearah. The Crystal Brook route would be more direct and, generally, better from the Commonwealth standpoint. Our suggestion is that the line should go from Red Hill to Crystal Brook, and then through Warnertown to within 4 miles of Port Pirie. That would mean a deviation of about 6 miles. Last year scarcely any wheat was carted from Wandearah by teams. The Crystal Brook Carrying Company sent a fleet of motors to that district, and they carted the wheat to Port Pirie at the rate of 1,000 bags a day. The wheat was taken from the farms and delivered at Port Pirie. The farmers received as much for it as they would have received had they delivered it at the railway station.

181A. *To Mr. Lacey.*—The distance between Red Hill and Crystal Brook is about 13 miles. The line covered by the agreement would cross the river Broughton about midway between O'Shaughnessy's Bridge and Cocky's Crossing, about 6 miles west of Crystal Brook. The Railways Standing Committee of 1924 recommended the western route, and the 1915 committee the Crystal Brook route. The proposal of the Crystal Brook people is to follow the 3-ft. 6-in. railway from Crystal Brook to within 4 miles of Port Pirie and then to go straight north past George's Corner to the Port Germein-road. It has been found difficult to conduct stock markets at Port Pirie because of inability to obtain agistment for stock. The result is that 75 per cent. of Port Pirie's meat requirements come from the Crystal Brook market; Wallaroo, Moonta, and Kadina also obtain their supplies there. Many of the cattle are railed at Oodnadatta, some coming from as far north as Henbury. They all come through Peterborough. Even if the line missed Crystal Brook, I do not think that Port Pirie would supersede Crystal Brook as a stock market. The cattle market might be affected; but not the sheep market, because nearly all the sheep sold at Crystal Brook are grown locally. Last week 5,000 sheep were sold there. Although early consignments of wheat are railed from Crystal Brook to Adelaide, most of the crop is railed to Port Pirie on the 3-ft. 6-in. railway. Port Pirie is the natural outlet; but in years of scarcity, when larger quantities of wheat are required in the south for milling purposes, more is sent there from Crystal Brook on account of our early harvest. We have sent 3,000 bags to Adelaide in one parcel. The route covered by the agreement, while not serving the Wandearah people well, would serve them better if the line were taken further west. If at sections 110 and 111 in the Hundred of Wandearah the line were diverted from the route proposed in the agreement, and taken through Munday's Gap to connect with the 3-chain road near Port Pirie, it would serve more Wandearah people. The further west the line is taken the greater the difficulty in coping with flood waters. The previous Railways Standing Committee had that in view when it recommended that the line should be kept as far east as possible. The conversion of the 5-ft. 3-in. gauge of the line from Adelaide to Gladstone through Brinkworth will not make much difference to Crystal Brook. The only difference will be that the break of gauge will be at Gladstone instead of at Hamley Bridge. There might be a little improvement in speed because of the wider gauge. At present there is very little passenger traffic to Adelaide from Crystal Brook through Gladstone. Most of the passengers to Adelaide motor to Red Hill and catch the 5-ft. 3-in. train there. The previous Railways Standing Committee which recommended the Crystal Brook route did so after having heard evidence on behalf of the people of Wandearah. They recommended that Wandearah, if given railway facilities, should be connected with Port Pirie by a small branch line. I do not think that the proposal to construct a line from Port Augusta to Hay was in the minds of the committee when it took evidence at Crystal Brook.

182. *To Senator Lynch.*—While it might not be correct to say that the different Railways Standing Committees, because of a change of their personnel, viewed this proposal from a political stand-point, I do not think that the last committee took any evidence at Crystal Brook. So far as I know, nothing happened between the finding of the first committee and the recommendation of the 1924 committee to weaken the case for the Crystal Brook route. The Crystal Brook people contend that Port Pirie could be as well served by a line through Crystal Brook as by a line on any other route. Our case was as strong when the 1924 committee investigated this proposal as when the report of the 1915 committee was made; but a change in the personnel of the committee caused the different recommendation to be made. I do not know what instruction the committees received, but I should imagine that they would be expected to consider the question without bias. At the Crystal Brook stock market both locally-grown stock and stock from a distance are dealt with. Most of the cattle from the north come from Dulkaninna, Mt. Leonard, and Todmorden, Mundowdna, Peake, Macumba, Eringa, Cowrie, Innamincka, and Clifton Hills. They are railed either at Marree or at Oodnadatta. Probably one-half of the cattle sold at Crystal Brook come from the north. Occasionally we get a train load of sheep from the north also. I could not say what proportion of the stock coming from the north is handled at Crystal Brook. When stock trains reach Peterborough some trucks go on to Abattoirs and some to Crystal Brook. The proportion would depend on the requirements of the abattoirs. Most of Sir Sidney Kidman's stock sold outside the abattoirs are sent to Crystal Brook. More than half of the stock from the north would go to Abattoirs. The local supply at Crystal Brook is not equal to the demand. If the Crystal Brook route were not adopted, and, instead, a siding about 6 miles away were constructed, with a branch line of the same gauge into Crystal Brook, our requirements might be met; but it would not suit us for the stock to be transshipped. I understand that the object of constructing the North-South line is largely to enable the pastoralists in the north to get their stock to market. In the event of the line from Red Hill to Port Augusta being constructed, most of the stock from the far north would probably travel on it, although some would probably continue to come via Peterborough. Cattle from Henbury, which is about 350 miles north of Oodnadatta, will be sent south when the North-South line is completed. Todmorden is about 50 miles from Oodnadatta. Before stock from the north are offered for sale they are depastured locally for a week or ten days. I gave no evidence before the last Railways Standing Committee regarding the claims of Crystal Brook.

183. *To Mr. Seabrook.*—Crystal Brook is already served with a 3-ft. 6-in. railway which connects Port Pirie with Broken Hill. At Gladstone a line goes south to Adelaide, and at Peterborough there are lines going south to Adelaide and north to Oodnadatta. Whatever the route of the proposed new line, considerable numbers of cattle would still be sent to the Crystal Brook market; but those from the far north which would travel on the North-South line might not do so. Rather than untruck them 6 miles west of Crystal Brook, their owners would probably prefer to send them to Adelaide. In that case the Wallaroo and Port Pirie requirements would have to be supplied from local sources, or at least from places other than stations on the North-South line. It would then probably be difficult to supply the demand. The route covered by the agreement does not go far enough west to be of material advantage to the people of Wandearah. If the people there are satisfied with the location of the proposed line it is not that it will meet their requirements, but that they are satisfied with a part when they cannot get the whole. From the Commonwealth point of view the Crystal Brook route is the better one. Wandearah could be served by a short line from Port Pirie.

184. *To Senator Barnes.*—Even if the line missed Crystal Brook I do not think that a cattle market could be established at Port Pirie, because of the absence of feeding grounds. The stock would be driven to Crystal Brook, and after the sale they would be driven back again. The committee which recommended the Crystal Brook route had in mind a State railway rather than a Commonwealth railway. I do not know what influences caused the 1924 committee to recommend a different route. That committee took no evidence at Crystal Brook. It might have done so had the invitation been given; but we were so satisfied as to claims of Crystal Brook and with the previous recommendations that we were lulled into a false security.

185. *To Mr. Metcalfe.*—Although my name appears as a witness in the report of the 1924 committee I gave no evidence before that committee. Mr. W. J. Venning, whose name also appears as a witness, died five or six years ago. I do not know how much extra it would cost to take the line along the Crystal Brook route. I know only that the 1915 committee reported that it would cost £19,000, of which £10,000 would be necessary for a break-of-gauge station at Crystal Brook. When I said that the 1924 committee recommended a different route because of a change in its personnel, I had in view the fact that it is usual in appointing such committees to give the Ministerial party the greater representation. I do not say that the absence of a minority report indicates that those members of the committee who did not belong to the Ministerial party were so weak that they agreed, against their convictions, to do something which would be to the disadvantage of their country. It is obvious that pressure came from Port Pirie to influence the committee. We contend, however, that Port Pirie could be as well served by a line through Crystal Brook as by a line along the route covered by the agreement. The Wandearah people may be satisfied with the proposed route if they cannot get one further west, but it will not meet their requirements to the same extent.

186. *To Senator Bull.*—We have had train loads of stock from Arcoona, so that it is probable that if the railway passed through Crystal Brook stock would come to the Crystal Brook market from stations on the East-West line. Crystal Brook does not offer any special inducements to bring the Commonwealth railway through that town, but we contend that that route would suit the Commonwealth better than any other. The claims of Crystal Brook depend largely on Crystal Brook being the first market town reached by stock from the north. I do not think that it would increase the demand for stock from stations on the East-West railway for the market to be at Crystal Brook instead of at another place. We sometimes have received stock from stations west of Port Augusta, but they have reached Crystal Brook via Peterborough. It is possible that large numbers of sheep from those stations would be untrucked at Crystal Brook if the line passed through that town. Otherwise I cannot see that the East-West line would benefit from the Crystal Brook route as against other routes.

187. *To Mr. Lacey.*—The agistment paddocks at Crystal Brook are mostly along the banks of the Rocky and Broughton rivers. That country is the same distance from the Commonwealth surveyed route as from Crystal Brook; it is about midway between the two points. Sometimes stock are taken to Yackamoorundie for agistment. I do not suppose that the 3-ft. 6-in. line to Broken Hill will ever be converted to another gauge, and as it is proposed to take the 5-ft. 3-in. gauge into Port Pirie, the adoption of the Crystal Brook route would mean that for some distance between Crystal Brook and Port Pirie there would be three railway gauges. I do not suppose, however, that any attempt would be made to mix the three gauges; the lines would probably run alongside one another.

The witness withdrew.

James Forgan, Managing Director of J. and R. Forgan Limited, of Crystal Brook and Port Pirie, sworn and examined.

188. *To the Chairman.*—I am aware of the nature of the inquiry being conducted by the committee. The Crystal Brook people advocate the line through that town, not only because its distance is a little less than that of the proposed line through Wandearah, but also because it provides the most direct route from Red Hill to Port Augusta. The original survey carried the line about 6 miles east of Port Pirie; that route is shorter than the Wandearah route. Crystal Brook is an important town, and its people feel that it will be isolated if the railway does not pass through it. If the 5-ft. 3-in. gauge is taken into Port Pirie, and also extended to Gladstone, via Brinkworth, Crystal Brook will be in between two towns on the 5-ft. 3-in. gauge railway. That would practically ruin Crystal Brook unless the Commonwealth line passed through that town. It may mean that stock which now comes to the Crystal Brook sale-yards would be diverted elsewhere. Another strong point in favour of Crystal Brook is the quality of the permanent water which is obtainable there. Port Pirie and the surrounding country obtains its water supply from Baroota and Beetaloo, but there have been seasons in which those supplies have become almost exhausted. The water from these reservoirs is fair. The Crystal Brook water is first class. The Railway Department has a well at Crystal Brook, about 1 mile from the station.

A few years ago when there was a water shortage the whole of the Railway Department's requirements on its northern system were supplied from Crystal Brook. By adopting the Crystal Brook route the line would travel for about 10 miles on Government land, and would cross farm land for a distance of about 3 miles only. From Crystal Brook to where the railway would leave the main line for Port Pirie the track would still be on Government land. I am not certain whether, after leaving Warnertown, it would not also travel on Government land along the stock route. Moreover, in the Crystal Brook district there are unlimited supplies of ballast. The grade between Red Hill and Crystal Brook is an easy one. The Wandearah country contains some swampy land which is useful only for sheep. If the line were taken through Crystal Brook, I think that the Commonwealth would obtain additional stock traffic from the north, as some of the stock which now is railed through Peterborough would come direct to Crystal Brook. Motor transport is superseding railway transport to a great extent. A large proportion of Crystal Brook's requirements is now sent by motor from Adelaide. Some of the Wandearah people have told me that even if the railway follows the Wandearah route they would still use motors to take their wheat to Port Pirie. Mr. Moncrieff, former Commissioner of Railways, in his evidence stated that, even if the line were constructed through Wandearah, he would connect Crystal Brook and Wandearah by a State railway because of the easy grades into Crystal Brook. He said that it would pay to take the traffic through Crystal Brook rather than over the line through Brinkworth where there are fairly heavy grades. There would be a great saving in haulage charges by having the line through Crystal Brook. There are ballast pits about 3 miles from Crystal Brook on the Rocky River, also at Crystal Brook Creek about 1 mile distant. The material is easily obtainable.

189. *To Mr. Cook.*—The Wandearah line is from 42 to 50 chains shorter than the line through Crystal Brook. I think that the original Commonwealth survey would make the line to Port Augusta a little shorter than the Wandearah route. The distance from Red Hill to Port Pirie by road through Wandearah is about the same as through Crystal Brook. I cannot see that the 4-ft. 8½-in. railway would mean very much to Port Pirie unless it were taken right into the town and on to the wharfs. I do not know what number of people the railway well at Crystal Brook would supply. It is about 80 feet deep, and has two drives. It contains good spring water. If I had the deciding of the route I should not take it across the Broughton River at any point west of Red Hill. About five years ago the water was 6 feet over the top of O'Shaughnessy's Bridge, and I understand that in places it was about a mile wide. It would be better to cross the Broughton nearer to Crystal Brook to avoid danger from floods. I do not think that the Commonwealth survey route avoids the flooded area.

190. *To Senator Lynch.*—I believe that the 1924 Standing Railways Committee inquired whether the Crystal Brook people had any fresh evidence to submit, and that the reason the committee did not visit Crystal Brook was that it was informed that no additional evidence was forthcoming.

191. *To Mr. McGrath.*—In that case it is probably correct to say that the committee considered the evidence which had previously been given by Crystal Brook interests.

192. *To Senator Lynch.*—I think that cattle from the North-South line would travel by the new railway, and be transhipped rather than travel by the narrow-gauge railway without transhipment, for the reason that the time taken for the journey would be so much less. A siding at Crystal Brook would, however, not satisfy us. The country in the neighbourhood of any siding which might be provided on the proposed route to serve Crystal Brook would not be suitable for depasturing cattle. I favour the line being taken into Crystal Brook in the interests of the community generally. Notwithstanding that the last Railway Standing Committee said that in making its recommendation it had, to some extent, given more consideration to Commonwealth convenience than to State requirements, I believe that a line through Crystal Brook would best suit the interests of the Commonwealth.

(Taken at Adelaide.)

TUESDAY, 9TH MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Lynch	Mr. McGrath
Senator Reid	Mr. Seabrook.

James Thomas Furner, Engineer for Surveys, South Australian Railways, sworn and examined.

193. *To the Chairman.*—I am aware of the nature of the inquiry being conducted by the committee, and also of the route which was recommended in 1924 by the State Railways Standing Committee, for a broad-gauge railway from Salisbury to Port Augusta. I understand that the agreement between the State and the Commonwealth provides that the route of the proposed railway shall be as nearly as possible the route recommended by the Railways Standing Committee of the State. I take it that the route was varied to tend further to the east, from about the 17-mile point from Red Hill, because of an arrangement between the railway authorities of the Commonwealth and the State. I am familiar with the route recommended by the South Australian Railways Standing Committee, and also with the route covered by the agreement. I examined the line from Port Augusta to Warnertown, at the request of the Commonwealth. The distance between Red Hill and Port Pirie along the route recommended by the State Railways Standing Committee is about 29½ miles. The original Commonwealth route through Crystal Brook and Warnertown would be about 30¾ miles. The length of the route covered by the agreement would be about 27 miles 4 chains, to where the existing line to Port Pirie would be crossed. The variation of the route has not been referred to me. The proposal recommended by the Railways Standing Committee was in connexion with a railway for State purposes only. I am familiar with the country in the Wandearah, Crystal Brook, and Port Germein districts. The route suggested by the Railways Standing Committee would serve the interests of Wandearah better than the line through Crystal Brook and Warnertown. The route covered by the agreement would serve Wandearah if a suitable station were provided. Without regard to local interests, and considering only a Commonwealth railway from Kalgoorlie to Adelaide, I favour the line covered by the agreement. There is practically no difference between the grades on any of the three lines proposed. In each case the grade would be easy. I do not think that there would be any further settlement because of the building of the line. The country which it would serve is already fairly well settled. The water facilities at Crystal Brook are better than at any point west of that place. At Crystal Brook there is an abundant supply of water suitable for locomotives. That water could be conducted to any suitable point on a line to the west of Crystal Brook. It would not be unreasonable to conduct it 5 miles. Ballast could be obtained more readily on the line from Red Hill to Crystal Brook, but there is not much difference between the various routes so far as ballast supplies are concerned. The State proposal was to cross the River Broughton in section 311, Hundred of Crystal Brook. I know that country. Below that point the Broughton occasionally overflows its banks. The State proposal was to cross the Broughton a mile or more above Cocky's Crossing. I anticipate no difficulty from flood waters along the route surveyed for a railway to meet State requirements. I do not anticipate that engineering difficulties would be encountered if the railway were brought into Solomontown along the 3-chain road. It would be of advantage to Port Pirie for the 4-ft. 8½-in gauge line to go through Solomontown, because that would provide for a goods station almost in Port Pirie. As, however, the Commonwealth will be unable to deal with goods traffic south of Port Pirie, the advantage would not be so great. The worst place for drift sand along the line would be between Long Plains and Goyder, near the River Wakefield. On that portion of the existing State line, provision was made to secure large areas of land so that it could be fenced to prevent cultivation and drift. Because of the precautions taken there has been no serious interference to the railway in that locality from sand-drift. The only difference that a third rail would make, so far as drift sand is concerned, would be a slightly increased cost for maintenance. I do not think that the third rail would increase the liability to derailment. It would necessitate greater care, and a little greater cost in maintenance. Payments for compensation for severance of land would be much the same whichever route is adopted. From about 22¾ miles from Port Pirie, on the route recommended by the Railways Standing Committee, the railway would follow the 3-chain road for some distance. For that length there would be no compensation payable. From the same point the line referred to in the agreement would go through private property. There would be ample room on the 3-chain road to provide for the usual railway reserves. In similar instances we have sometimes laid the railway down the centre of the road, leaving a 1-chain road on each side. I have no experience in connexion with land valuation, and do not know the present average price of farm lands in the district. If the original proposal to go through Crystal Brook and Warnertown were adopted, difficulty would be experienced in taking the line into Port Pirie and out again. The line could follow the existing line to within 2 miles of Port Pirie, and then turn off. That is practically the same place as that at which the line referred to in the agreement would cross the existing 3-ft. 6-in. line. From that point the line could be continued to Port Augusta without difficulty That proposal, however, would not give to the Wandearah people the same facilities as would the line farther west. There is not a great deal of difference between the three routes.

194. *To Mr. Seabrook.*—The line from Red Hill to Port Augusta was not surveyed. It was merely examined with an aneroid barometer to determine the grades. No actual survey was made. Sand-drift would be greater in cuttings than on embankments. Difficulty would be experienced where there were cuttings in country liable to sand-drift. There would, however, be no very deep cuttings on the line, and I do not anticipate that there would be any great trouble from sand-drift. I do not think that Crystal Brook would receive a set-back if the railway missed that town. Most of the railway traffic of Crystal Brook is in connexion with the railage of goods between Broken Hill and Port Pirie. The line through Wandearah would serve the district better than a line through Crystal Brook, and would probably be of greater benefit to the State.

195. *To Senator Reid.*—Crystal Brook is supplied with water from the Beetaloo reservoir. It also has an independent supply of good water from the Crystal Brook creek. No difficulty would be experienced in providing water if the Crystal Brook route were not adopted. The water in the River Broughton is not suitable for engines. On the section between Red Hill and Port Pirie water equal to that from Crystal Brook could not be obtained elsewhere. Port Pirie is supplied with water from Beetaloo Portion of the Hundred of Red Hill is supplied with water from the same source. There is no necessity for the line to go to Crystal Brook in order to obtain Crystal Brook water. I consider that there would be a fair amount of passenger traffic from Port Pirie The proposed site for a station near Port Pirie would be suitable for passenger traffic to and from Port Pirie.

196. *To Mr. Lacey.*—I am not certain whether the railway locomotives obtain water at Red Hill now The water which could be supplied at Crystal Brook could also be supplied at other points on the route referred to in the agreement By going into Solomontown the length of the line would be increased a little The increase might be as much as 2¼ miles. The State proposal provided for a line which was not so straight as the Commonwealth proposal. The State proposal was the result of an examination, whereas the Commonwealth proposal was the result of an actual survey I examined the country for a deviation of the line, leaving the proposed Commonwealth route at section 110 and 111 Hundred of Crystal Brook, near Merriton, and going through the range at Munday's Gap That line would necessitate some fairly heavy grades on both sides of the Gap, and, in order to avoid the flood country in the Hundred of Wandearah, it would be necessary to keep east of the eastern boundary of that Hundred where, in section 240, Hundred of Crystal Brook, a station site could be provided which would be only a little over a mile west of the station site that could be provided on the other line. The report was against the proposal to go through Munday's Gap for those reasons. The cost of earth work would be heavy in the flood area if the line were taken further west. The Wandearah route would serve the Wandearah district better than the route referred to in the agreement. If the line were constructed along the Wandearah route, I think that the people there would use the railway instead of carting their wheat to Port Pirie. I think that it would be better for the 5-ft. 3-in. railway to enter Port Pirie below the Solomontown railway station, travelling along the 3-chain road, than to follow the existing 3-ft. 6-in. railway. There would be no great engineering difficulties, but it would mean over 2 miles additional length of railway. By following the 3-chain road, it would not be necessary to repurchase so much land as would be necessary by following the suggested Commonwealth route. I know the country between Port Germein and Port Pirie, I examined it for the Commonwealth. The sand-drift would be greater on cultivated land than on swamp land. That remark would apply to the proposal to take the line further west than the suggested route alongside the Port Germein road to what is known as Williams' Corner. I have not examined the Commonwealth surveyed route.

197. *To Senator Lynch.*—The procedure adopted in South Australia in connexion with railway routes is for an examination to be made by the surveyors to select the line which gives the easiest grade, the best curves, and the shortest distance, having regard to the requirements of the country and the necessity for stations. A preliminary estimate of cost is then prepared, after which a permanent survey is made and plans and sections prepared, from which exact quantities and the grades are determined. The inquiry by the Railways Standing Committee is generally conducted in the beginning, when the request for the railway

is submitted The examination is generally made before the committee commences its investigations. In the case of the proposed railway from Red Hill to Port Pirie, the route was examined before the committee made its inquiry. The route selected by the department was not altered materially by the committee. The committee had before it all the evidence that had previously been obtained regarding the alternative routes. I do not think that it would be right to say that the route was varied to a more westerly location because of political considerations, caused by a change in the personnel of the Railways Standing Committee. The route along the 3-chain road was recommended because of representations made by the residents of Port Pirie. I do not think that political considerations had anything to do with the fixing of the route. The route through Solomontown would probably be the best one from the State point of view; but as the agreement limits the use of the line, the route referred to in the agreement would probably be the next best. A good deal of the country on the western side of the Flinders Range, between Port Pirie and Port Augusta, is good farming land. Approaching Port Augusta it is more suitable for grazing than for agriculture. I do not think that the proposed railway would promote settlement in that district. I have not been over the route surveyed by the Commonwealth, but I made the first examination for the Commonwealth from Port Augusta to Warnertown. I do not suggest any alteration of the route covered by the agreement. To provide a direct connexion between Port Augusta and Adelaide, without regard to Port Pirie trade, I think that the route covered by the agreement is the best one.

The witness withdrew.

Charles Buxton Anderson, Acting Chief Engineer, South Australian Railways, recalled and further examined.

198. *To the Chairman.*—As requested by the committee, I have attended to give details of the estimate of the cost of a third rail between Red Hill and Adelaide. They are as follow:—

Third rail on existing track	£158,025
Permanent way, 4-ft. 8½-in. gauge ..	68,510
Surface forming..	2,880
Fixed points	2,750
Long timbers	2,200
Leads	4,080
Crossings	7,140
Base plates	423
Water columns	900
Red Hill transfer yard	10,000
Abattoirs, stock arrangements	3,000
Alterations to bridges, &c.	9,000
Extras between Adelaide and Salisbury, n/c 100-lb. rail, &c.	3,003
Land, &c.	18,000
	£290,811
Engineering and supervision, 5 per cent. .	14,540
	305,351
10 per cent . . .	30,535
	335,886
Work in Adelaide yard	34,000
	369,886
Signalling, one-third	58,775
	£428,661
Say £450,000.	

This estimate was prepared when it was proposed to go round the various station yards. Since then it has practically been decided to go through the station yards. I do not think that that alteration materially affects the estimate. The item, £68,510 for "permanent way 4-ft. 8½-in. gauge," is for a 4-ft. 8½-in. permanent way, apart altogether from the 5-ft. 3-in. track. I think that Mr. Hobler prepared his estimate on the same basis. The amount of £2,200 for long timbers is for the longer timbers which would be required at turn-outs. The £4,080 for leads includes laying the turn-out rails. The item "Crossings, £7,140" is for places where one rail would cross another. There would be a number of such places. The base plates for which £423 is set down would be required on curves. Water columns, for which £900 is set down, would be required at three places. The sum of £10,000 is set down for a transfer yard at Red Hill, at the end of the 5-ft. 3-in. line. I shall obtain particulars of that amount. The sum of £3,000 set down for stock arrangement at Abattoirs is necessary for dealing with stock carried on the 4-ft. 8½-in. gauge line. Abattoirs is situated about 6½ miles by road from Adelaide. As there will be a fair amount of work necessary on culverts, bridges, and cattle pits, the sum of £9,000 is set down for strengthening them. At the cattle pits a girder to carry the third rail would be necessary, and the superstructure of the bridges would also require some adjustment. The third rail could not be laid on the transoms in all cases, as the shearing force would be too great. Further steel work would have to be introduced. Regarding the item, £3,903, "extras between Adelaide and Salisbury, on account of 100-lb. rail, &c.," the original estimate was based on an 80-lb. rail. The South Australian Railway Department intends to lay its main trunk line with 100-lb. rails in the near future. The sum of £18,000 is set down for land and compensation. At Dry Creek we should have to obtain additional land to deal with stock arriving by 4-ft. 8½-in. gauge trains, and if the line were taken round the station yards, further additional land would also be required. We do not anticipate having to purchase land along the ordinary right-of-way. The 10 per cent. addition of £30,535 is the usual addition for contingencies. Work in the Adelaide yard, for which £34,000 is set down, includes engine sheds, turntable, platforms, and other terminal facilities. The sum of £58,775 is set down for signalling. It is the department's policy to introduce the electric system of signalling throughout its railway system so soon as the traffic on the lines warrants it. That system is being put into operation between Terowie and Serviceton. The system is not different from that in operation in some of the other States where electric signals are used. The £58,775 represents one-third of the total cost of the installation of electric signalling between Adelaide and Red Hill. The Commissioners agreed that that would be a fair apportionment of the cost. I am not certain whether that system would have been put in hand on the line from Salisbury to Red Hill if it had not been for the proposal to run Commonwealth trains over that line. The work might otherwise have been postponed until the traffic on the line warranted it. Regarding the £34,000 for work in the Adelaide yard, the department is spending about £300,000 in improving the central station at Adelaide. The amount set down would cover the special provision necessary for bringing transcontinental trains into the Adelaide station. I am not familiar with the River Broughton in the vicinity of Cocky's Crossing, and have never seen that river in flood there. I have seen it in flood at Yacka. I am unable to offer any opinion regarding flood levels at Cocky's Crossing. I have not been supplied with details of the Commonwealth estimate of £380,000. Every effort would be made to carry out the work both economically and efficiently.

199. *To Mr. McGrath.*—Although the total of the several items is £428,661 only, detailed plans had not been prepared when the estimate was made up. It is considered that about £20,000 more should be allowed for emergencies, making £450,000.

200. *To Senator Reid.*—From my experience of the River Broughton, I should say that when in flood there is a swiftly flowing stream of water. I am unable to

say how much of the proposed route would be affected by flood waters. I do not think that the floods would seriously affect the line for more than a couple of days.

201. *To Mr. Lacey.*—One operation of the lever would work the points of both gauges. I do not anticipate any trouble from expansion and contraction, because one bar would be 4 ft. 8½ in. long, and the other 6½ inches only. In practice it would be found that no insurmountable difficulties would arise from that cause. In connecting these rods, adjusting screws are introduced. The necessary adjustments would be merely a matter of maintenance.

202. *To Senator Lynch.*—The whole of the £18,000 for re-purchase of land would be for private resumption. I see no difficulty in proceeding with this work promptly should authority to go ahead be given.

203. *To Mr. Seabrook.*—I have no idea of the average cost per acre, or of the number of acres which would have to be purchased. Between Red Hill and Adelaide there are 24 stations. I do not know the acreage covered by them. Station yards are generally from 4 to 6 chains wide, and from 15 to 30 chains long. Their average area would be about 12 to 15 acres. Although the amount of £18,000 may appear to be high, it must be remembered that some station yards are in the middle of townships. To acquire land at places such as Salisbury, Ovingham, Islington, and North Adelaide, near Adelaide, would be expensive. The amount set down for the Red Hill transfer yard would include tracks to facilitate the transfer of material, as well as the provision of other terminal facilities, such as goods sheds, &c.

204. *To the Chairman.*—If the line were taken through the station yards, the £18,000 for the re-purchase of land would be reduced. I shall let the committee have particulars of the estimate of £18,000 for the re-purchase of land, and of the £10,000 for the Red Hill transfer yard.

(Taken at Melbourne.)

WEDNESDAY, 10TH MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Lynch	Mr. McGrath
Senator Reid	Mr. Seabrook.
Mr. Gregory	

Edward Henry Ballard, M. Inst. C.E., Chief Engineer of Way and Works, Victorian Railways, sworn and examined.

205. *To the Chairman.*—I have no first-hand knowledge of the use of mixed gauges outside Australia, as I have not been outside the Commonwealth during the past 40 years, but I am familiar with the use of a third rail at Wodonga and Tocumwal. At Wodonga the third-rail system has been partially installed in the dead-end sidings for the stock-yards since about 1883, and the installation is confined to about 430 lineal yards of track. Particulars of this installation have, I understand, been supplied to you by Mr. H. W. Clapp. I may remark that the tentative plan prepared for the possible future re-arrangement of Wodonga station-yard, for use when extensive renewals become necessary, provides for the abolition of the third-rail system at Wodonga. At Tocumwal the third-rail system is in partial use on about 180 lineal yards of track for the turn-table roads and the flour-mill siding. The tentative plan for possible future requirements at Tocumwal eliminates all use of the third-rail system. After the trial installation at Tocumwal of the third-rail system (as arranged by the New South Wales Government in 1915) had been condemned in 1918 by the Board of Experts from each State and the Commonwealth, the installation was removed. Subsequently we were asked whether any objection would be raised to installing the third-rail system clear of the station yards between Tocumwal and Strathmerton (about 10 miles), and the Victorian authorities refused to entertain the proposal, the third-rail system being considered unnecessary and highly undesirable from a safe-working point of view. I am aware that the proposal in this instance is that the third rail shall be used only as a temporary expedient to cope with special circumstances. But I do not think it should be adopted for that purpose. Either the whole of the South Australian system, between Adelaide and Port Pirie, should be converted to the 4-ft 8½-in. gauge, as a first instalment of the general unification scheme, or a new 4ft. 8½-in. line should be built parallel to the existing 5-ft. 3-in. line, with a view to the ultimate removal of the latter At Wodonga no difficulty was experienced in laying the third rail, which is of light section, 66 lb. material, with flat fishplates. No undue expense is involved in the maintenance of the third-rail track, on which the traffic is very light and conducted at very slow speed. Only two accidents or difficulties have occurred within my recollection, and both happened at Wodonga, in 1924 In one case a Victorian engine, and, in the other case, a New South Wales engine, became derailed on the stock-yard siding provided with the third rail. Both mishaps were attributed to the special points being wrongly set to suit the gauge of the approaching engine. It may be added that at Wodonga, as at Tocumwal, traffic on the third-rail tracks, in dead-end sidings, is conducted at low speed—practically walking pace—and the risk of mishap, under such conditions, is infinitely less than on a main trunk line where passenger trains would run at comparatively high speed. The principal disadvantage, in the use of a third rail, is that the system is not conducive to safe railway working, particularly on a main trunk line for passenger traffic operating at comparatively high speed. The system is not regarded as unsuitable for use on short sections for special conditions on sidings at cattle-yards or similar locations. I accompanied Messrs. Blake and Whyte, members of the Royal Commission on Uniform Gauge, on their inspection of the Victorian Railways, and was closely associated with them in the preparation of estimates for the conversion of Victorian lines from 5-ft. 3-in. to 4-ft. 8½-in. gauge. With the concurrence of the Royal Commissioners the use of the third-rail system was deliberately excluded from the conversion schemes, either as a temporary expedient during change of gauge operations on the main running lines, or as a makeshift in the temporary transfer sidings at dépôts, it being considered that the use of the third rail would be objectionable in respect of safe working, and unnecessary. In a combination of 4-ft. 8½-in. and 5-ft. 3-in. gauges, with a third-rail system installed with Australian standard rails, the distance between the heads and between the flanges of the rails would be—80-lb. rails, between heads, 3⅜ inches; 100-lb. rails, between heads, 3½ inches; 80-lb. rails, between flanges, 1½ inches; 100-lb. rails, between flanges, ⅞ inch. The rail joints, on a third-rail system, would necessarily be "staggered." With Australian standard 80-lb. fishplates, the distance between the flange of the fishplate, and the flange of the adjacent rail, would be about ¾ inch. With 100-lb. fishplates the flange of the fishplate would foul the flange of the rail to the extent of ⅞ inch. There would be no insuperable difficulty in laying the rails. Greater trouble would occur in dogging, as driving of the spikes would have to be done in a confined space, and the operation would have to be carried out with more accuracy, as adjustment of badly-driven spikes could not easily be rectified. More trouble would also be experienced in properly seating the fishplates than on a

normal track. Fishbolts would require to be inserted from the outside of the fishplates, and all nuts would, therefore, be located between the rails, involving a departure in the design of the Australian standard fishplate. For 100-lb. fishplates the Australian standard design would also require modification to provide clearance from the flange of the adjacent rail. The cost would be increased, because cross-dogging could not be effected, and more spike holes would have to be bored, thus tending to shorten the life of the sleepers. The cost of sleepering would also be increased by reason of the additional adzing required, and on account of the greater difficulty in releasing old sleepers from the rails. The danger of derailment on account of articles lodging in the space between the rails on a third-rail track is considerable, and must be anticipated. On a third-rail system the danger of derailment is undoubtedly greater than on a normal track. This danger would be greater to the train on the 5-ft. 3-in. track. The train on the 4-ft. 8½-in (third-rail) track would also be liable to more risk of derailment than on a normal track by an obstruction projecting over or above the 4-ft. 8½-in. rail fouling the tread of the wheel of a 4-ft. 8½-in. vehicle. The obstacles to be mostly apprehended are portions of rolling-stock gear, such as brake blocks, W guards, and other under-gear, which may break away and fall on to the rail. A bag of wheat, a bale of wool, or some other merchandise might fall from an open truck and lodge on the track. Drift sand is another likely cause of derailment. On the Mallee line, about Mildura, where the sand is troublesome, we have frequently to send out special gangs of men to shovel sand off the flange way. Experience shows that trains, travelling at slow or moderate speed, are liable to derailment by reason of obstructions on the line, but the consequences of derailment at high speed are certainly more serious than at low speed, and the added danger to the 5-ft. 3-in. train, on a third-rail track, cannot be regarded as negligible. On the Victorian Railways system, check or guard rails are usually provided on sharp curves of 10 chains radius and under. At such places speed restrictions are enforced, and the rails are subjected to closer and more frequent inspection than those on the normal track. Sharp curves on main-trunk lines, in Victoria, are not numerous, and the percentage of check rails to ordinary rails on such lines is so small as to be almost negligible. The distance between the heads of the check rail and the adjacent running rail varies from 1⅞ inches to 2⅜ inches to suit the different radii of curves. I cannot recall any instance where the lodgment of anything between the check rail and the running rail has been definitely known to have caused a derailment. I would most definitely oppose any proposal to run a third rail from Port Augusta right into Melbourne. If other engineers have said that such a device is practicable and safe I differ from their opinion.

206. *To Mr. McGrath.*—My first-hand knowledge of the use of a third rail is confined to the systems installed at Wodonga and Tocumwal. Many years ago a third rail was laid at Serviceton on the 3-ft. 6-in. gauge; such a combination is not on all fours with the proposal to mix the 5-ft. 3-in. and 4-ft. 8½-in. gauges. I have said, in the proposed third-rail system, using 100-lb. rails, the distance between the flanges would be only ¾ of an inch. There would be no insuperable difficulty in dogging the rails under those conditions, provided competent platelayers only were employed.

207. *To Senator Lynch.*—My objection to the third-rail system is based on both my own practical experience and the knowledge I have gained from reading. Since 1910, when the third-rail device was brought prominently under the notice of the Victorian Railway authorities by some gentlemen in New South Wales, I have been closely connected with all such proposals. I have also carefully studied all literature on the subject, and given a great deal of attention to actual experiments conducted in Australia. The risk of derailment is inherent in the third-rail system. It may be said that, with very close supervision, the risk can be minimized. But the fact remains that, with equally close supervision, there would be less risk with a normal pair of points than with any third-rail device. The risk to a train running at high speed on the third-rail system is so extensive as to make such an installation unwarranted. There would be less risk from a combination of the 3-ft. 6-in. and 5-ft. 3-in. systems than from a combination of the 4-ft. 8½-in. and 5-ft. 3-in. systems. But in either mixture the risk is greater than with an ordinary track. As a railway man, I am a strong advocate of the unification of gauges, and I conscientiously believe that the proposal now before the Committee affords a good opportunity to introduce general unification, by altering the South Australian system between Adelaide and Port Augusta to the 4-ft. 8½-in. gauge. The unification must extend to the branch lines also.

208. *To Mr. Gregory.*—I have no personal knowledge of any railway system in the world which has employed a third rail to combine the 5-ft. 3-in. and 4-ft. 8½-in. gauges. Certain lines in England were laid with a third rail, when I left there, about 40 years ago, but the third rail has since been abolished. I understand from reading and inquiry that a similar course has been adopted in America. I do not see that any great advantage would be gained by continuing the 4-ft. 8½-in. gauge to Red Hill, and then having a 5-ft. 3-in. gauge through Adelaide and Melbourne to Albury. That would be merely changing the station at which passengers, goods, and mails are transferred. The difficulty can be obviated only by the unification of gauges, and that necessarily involves the conversion of the branch lines also.

209. *To Senator Reid.*—It is unlikely that goods would fall from box trucks on to the rails and cause derailment. I corroborate Mr. Clapp's evidence that an investigation of the records of the Victorian Railways shows that, during the last five years, 105 derailments are definitely known to have been caused by obstructions on the line—principally nuts, fishplates, stones, and parts of rolling-stock equipment which had come adrift. Not infrequently bales of wool and bags of wheat fall on the line. The single rail-head is only 3 inches wide, and is curved. When a third rail is laid, the distance over the head is 9 inches, and, undoubtedly, the risk of material lodging on the rails is increased. The points used at Wodonga and Tocumwal, in connexion with the third-rail device, were of the simplest pattern. I submit a plan showing how the New South Wales 4-ft. 8½-in gauge line is brought to Wodonga. Much more complicated points would be required for main line traffic, and the more complicated the system, the greater the risk of human error. In preparing my evidence for the Committee to-day I did not take into consideration points and crossings; if I had done so my condemnation of the third rail would have been very much stronger. The space between the rails would be so small that material of the requisite strength could not be used for the points and crossings. Therefore, there would be an increased risk of breakage. Of course, if the points were properly set and secured, and no break occurred, the system would operate all right, but one cannot calculate on a basis of infallibility and perfection. In comparison with ordinary points and crossings those for a third rail would involve undesirable complications. The life of a sleeper is judged, more or less, by its hold upon the dogspikes. The loosening of the spikes is the first indication that a sleeper is deteriorating. Then new holes must be bored and the old spikes removed. The loosening is caused by vibration and deterioration of the wood. In the first instance, two holes are bored in the sleeper diagonally on opposite sides of the rail. When re-dogging takes

place two new holes are bored diagonally from the opposite corners. We never bore more than four holes in each end of a sleeper. With a third-rail device four holes would have to be bored in the first instance, and the sleeper could not be re-dogged. Thus its life would be reduced by 50 per cent. It is not desirable to re-dog with the holes almost directly opposite each other, because of the greater risk of rail creep. I do not say that the dogging presents any serious obstacle to the use of a third rail, but certainly the sleeper would decay quicker, because, from the outset, it would have four holes in it.

210. *To Mr. Seabrook.*—In the Victorian Railway system there is no intricacies of working or close running of rails comparable with those that would exist under the third-rail arrangement. I do not admit that the lines, in the Victorian system, run close together. They cross one another at a certain angle, but they are close together only at the point of intersection, and they get away from one another immediately. The most acute angle at which the rails pass one another is one in nine. Nine feet away from the point of intersection the rails are 1 foot apart, and 18 feet away they are 2 feet apart. It is good railway practice to alternate the heads and ends of the fishbolts when putting them in the rails. The majority of the fishplates used in Victoria have six holes. In three of them the heads enter from the one side, and in the remaining three the heads enter from the other side. This is done because, in case of derailment, the nuts are liable to be sheared off. If the fishbolts were put in from the inside it would be a departure from our ordinary practice, but not a very consequential one. With the third rail it is impossible to get the bolts in the fishplates in the space between the rails, because the length of the fishbolts is more than the width of the space between the fishplates. I have prepared a drawing, showing details of both 80 and 100 lb. rails, and this, when completed, I shall supply to the Committee. Taking the two 80-lb. rails, as shown therein, it seems to me impossible to enter the fishbolts in the space between rails, and this confirms my impression that those who gave the demonstration in Adelaide did not use Australian standard material as agreed upon by the engineers and Commissioners of all the States. The standard fishplate stands out 1¼ inches from the rail, and, therefore, the standard fishbolt could not be applied between the two rails, if laid with standard material. Danger is greatly accentuated by the third-rail principle, and, therefore, it is desirable to avoid all complications and points, and crossings. The degree of danger from the drift of sand in a cutting, a filling, or a level, largely depends on local conditions, the general direction of the wind, and the slope of the banks. In Victoria we meet conditions as they arise. In many cases we pin ti-tree, or other material, down on the sandy banks to prevent material blowing away and drifting on to the rails, but this would be a matter of local arrangement. I could not give any general advice on that matter. This third-rail proposal is not, in my opinion, the first step to unification. Any such proposal for the conversion of gauge is absolutely condemned by the Royal Commission, and I strongly uphold its view. I would not alter my opinion on account of the evidence of Mr. Webb, the South Australian Railways Commissioner, although I say it with great respect to him.

211. *To Mr. Lacey.*—I have already said that the percentage of guard rail to normal track is so small as to be almost negligible. In Victoria the rail guards are on the main running lines. I think that Mr. Clapp, in his evidence on this subject, was differentiating between main trunk lines and branch lines. I am referring to running lines as distinct from points at railway stations. I previously mentioned two accidents that have occurred on a third-rail system owing to a mistake having been made in moving the points. In one case the operator saw a 5-ft. 3-in. gauge engine coming, which he thought was a 4-ft. 8½-in gauge engine. He set the points accordingly, and the engine was derailed. In the other case the engine was of 4-ft. 8½-in. gauge, and the operator set the rails for the 5-ft. 3-in. gauge. The use of one bar to operate simultaneously the points for both gauges would be effective for a simple turnout, but no station would be equipped with simple turnouts. There are complications in points and crossings to be considered, as for instance, single and double compound points, deltas, and three throws, all of which are part and parcel of the railway-yard equipment. It is impossible with a third-rail system to provide proper appliances to ensure anything like the safe working of a normal track. Of course, the conditions are different at Wodonga and Tocumwal. At Tocumwal there is only one blade to shift the gauge for the track. Under the third-rail system it would be impossible to re-dog the sleepers, either for 80 or 100 lb. rails. If the Committee has had evidence to the contrary I should be inclined to think that it had been given under a misunderstanding. With 100-lb. rails there is only ¾ of an inch between flanges, and with 80-lb. rails only 1½ inches between flanges. The dogspikes are ¾ of an inch thick. It is obvious that, with 100-lb. rails, there could not be two holes ¾ of an inch wide opposite one another, because it would mean 1½ inches in ⅞ of an inch space. No experienced railway man would dream of putting spikes opposite one another, because, by so doing, the tendency to rail creep is greatly increased. On the Victorian main country lines the sleepers are 10 inches across, but provide an efficient bearing of only about 8 inches. On the third-rail system it would be impossible to re-dog a 10-inch sleeper.

The witness withdrew.

Ernest Henry Stanley, late Representative and Resident Engineer, Transandine Railway Company sworn and examined.

212. *To the Chairman.*—In the Argentine Republic I had actual experience from 1912 to 1918 of the operation of a mixed-gauge system over a section which handled very heavy freight and passenger traffic. I was the supervising engineer for the Transandine railway which was constructed on the metre gauge. As each section was completed it was let to the Great Western Railways Company which operated it. The Great Western Railways Company's main system was constructed on the 5-ft. 6-in. gauge. The mixed gauge section was about 4½ miles in length, and had a ruling grade of 1 in 50; the lowest curve was of 9 chains radius, and the maximum speed was about 35 miles an hour. During the time that the third rail was under my observation no accident occurred, and no trouble was experienced in operating the system. The points for the 3-ft. 6-in. and the 5-ft. 6-in. lines were operated by the one action. I can conceive that there would be greater danger from obstacles lodging on the lines if a 4-ft. 8½-in. gauge were built within the 5-ft. 3-in. gauge, but I would not be afraid to install such a device. It seems to me suitable for the Adelaide to Port Augusta line, and I apprehend no constructional difficulties or danger to human life. In the Argentine the rails were fixed to the sleepers with coach screws. My observation of them is that they are superior to dogspikes, because they last longer, and have a better hold upon the sleeper. In fact, we found it very difficult to withdraw the screws, because they seemed to rust into the timber, which was similar to the Australian redgum, but much harder. The screws were driven diagonally, and when in the course of time they loosened larger gauge screws were inserted in the same holes. The weight of the engines was about 125 tons.

213. *To Mr. Gregory.*—Mendoza is the centre of a very large province, and practically the whole of the

freight and passenger traffic of the province entered the Central station, which was about a mile from the narrow-gauge station. The Great Western Railway Company had a system of *circuitos* or circular railways to handle the heavy suburban traffic. The concession to construct the second *circuito* was not exercised for some time, and, in the meantime, land values had increased so much that the cost of resumption was almost prohibitive. So the company approached the Transandine Company and obtained leave to lay a third rail on its metre track for a distance of 7 kilometres. Practically the whole of the traffic in the province ran over that section, and when I left the Argentine about 80 trains were passing through the central station daily. Of course, in order to allow the third rail to be used the whole of the section to which it applied had to be re-laid with longer sleepers and heavier rails. I had no part in the operating of the system; I merely represented the Transandine or Proprietary Company, and saw that its interests were safeguarded. So far as I recollect no special staff was required to attend to the maintenance of the third-rail section; the whole of the work was done by the ordinary gang. There might be a danger if only a few inches separated the two rails. In the Argentine we did not experience any danger or difficulty at all in that respect. Under the present proposal there would certainly be some danger. Over a section of 70 or 80 miles it is possible that some obstruction between the rails might cause a derailment. The first duty of a railway engineer is to provide for the safety of passengers. A large element of danger would not justify the construction of the third rail. In this instance the risk must be taken of obstacles falling in between the rails. In any case I do not think that the risk would be abnormal. Practically the whole of the railway curve from Flinders-street to Spencer-street is check railed, and there have been no accidents through articles falling in between the rails. Under proper supervision there should be no trouble in this direction. The man in the engine on the lookout would hardly have time to notice a small obstruction, such as a bar of steel, on the line. It seems to me that the danger with the third rail is not so great as it appears to be at first sight. My experience in railway systems in Australia has been confined only to survey work. In the Argentine coach screws were not always used. We used dogspikes as well. I believe that, in the United States of America, where the sleepers are of pine, and possibly soft woods, dogspikes are used. Our sleepers were much harder than the Australian hardwoods.

214. *To Mr. Seabrook.*— With the third rail there would be no danger from obstacles falling in between the rails, providing that there was sufficient clearance from the flanges. If the line were inspected every morning by efficient track inspectors, and properly attended to, there would be little danger at all from falling articles. The coach screw has a square head. No washer is placed underneath it. They are specially made for the purpose. I do not think that there would be any difficulty with the points on a third-rail system.

214a. *To Mr. Lacy.*— In the Argentine we did not experience any trouble from a rocky track, due to the third rail, and there would be less likelihood of trouble if the two rails were close together. We had no trouble with the points of the two gauges. The system was regarded as safe. One bar shifted the whole of the points simultaneously. It was a satisfactory arrangement. The middle blade did not, on any occasion, become loose. From my experience it would be efficient railway construction for fishplates to be bolted on one side, that is, on the outside. I have known frequent instances of the bolts entering from the inside, and all the nuts being on the outside. This practice is considered to be safe, because in case of derailment the nuts would not be shorn off.

215. *To the Chairman.*—I believe that there was another small section of third rail constructed in Chili. The third rail is generally used to overcome a difficulty such as this present proposal. Of course, there is a possibility of the lodgment of some article between the two rails, and then there is the difficulty of constructing points to ensure safety. I do not know of any other disadvantage. I think that competent engineers would be able to provide for those contingencies. In my opinion, the third rail could be safely taken through a station. There was one crossing close to the Transandine railway yard in the Argentine, over which the trains never slackened speed. Frequently they would travel at 50 miles an hour. It would be feasible and safe to take a third rail into the Adelaide railway yard to an outside platform.

(*Taken at Melbourne.*)

THURSDAY, 11TH MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Gregory
Senator Lynch	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

James Alexander Smith, Consulting Engineer, Melbourne, sworn and examined.

216. *To the Chairman.*—I am unaware of any instance outside Australia in which the third rail is used to permit of rolling-stock of 5 ft. 3 in. and 4 ft. 8½ in. traversing the same route. I understand that Mr. Webb, the South Australian Railways Commissioner, in his evidence before the committee, stated that large mileages of mixed gauges had been working successfully in the United States of America for many years, but I know of no instance of the use of a 5-ft. 3-in. gauge track in the United States of America, either alone or in combination with a 4-ft. 8½-in. gauge. On the authority of the report of the United States Interstate Commission for 1923, of 258,272 miles of railway then in operation in the States, 1,364 miles only were of gauges other than 4 ft. 8½ in. So far as my information extends the latter small mileage consists of narrow gauge (3 ft., 3 ft. 6 in.) feeders or special tracks, and that a third rail use applies only to a small part of such small mileage. The cases are non-parallel. I am of opinion that the lesson conveyed is that all gauges except one should be eliminated, and that any very exceptional use of the third rail in the United States of America cannot be soundly advanced for the similar use here of different gauges (introducing difficulty and danger by reason of such difference), and in respect of traffic of primary importance. It is important to bear in mind that the whole of the gauges, other than 4 ft. 8½ in., in the United States of America are a negligible quantity. I noticed in the Melbourne *Herald* a report of the successful use of mixed gauges on the great western and trans-Andine railway companies lines in South America; and in a letter by myself published in the same paper on 12th February, I pointed out that the conditions in the two countries were not parallel, the wider gauge in the South American instance being materially wider than the 5 ft. 3 in. in use in South Australia and Victoria. I have no knowledge of the use, in combination in any instance in any country, of the gauges proposed to be used here, and I am of opinion that statements made with regard to gauges and conditions that do not obtain in Australia cannot be accepted as safe or sufficing in respect of the actual conditions to be met. I do not know what advantages have been claimed by

other witnesses for the third-rail principle, but I know of no claim that could be considered to possess validity save that the meeting of certain costs, which must inevitably ultimately be met, may possibly be deferred. I cannot say also what disadvantages have been urged by other witnesses against the use of the third rail, but I submit that the adjacent rails in a three-rail combination of the 5-ft. 3 in. and 4-ft. 8½-in. gauges would be so close together that the closeness of the flanges would militate against effective or certain spiking to the sleepers, and the rails would constitute a channel that would unavoidably become choked with sand, mud, ballast, or other debris, thus preventing, throughout its whole length, that continuous and close inspection that is the price of safety. It would almost completely prevent the observation, in time to avert trouble, of defects by the men on the locomotive, one of whose functions is the constant observation of the line ahead. Further, such limited space would decrease the effectiveness of the operation of the platelayers. Their work would have to be done within the space of a very few inches. For example, with 80-lb. standard rails the space between the rail heads in the case of 5-ft. 3-in. and 4-ft. 8½-in. mixed gauges would be 3¾ inches, and the space between the flanges would be only 1¼ inches. Using 100-lb. rail the space between the rail heads would be 3½ inches, but the space between the flanges would be reduced to ¾ inch, so that the flange of each rail would have to be cut to allow of the driving of the spikes, which might be ⅝ in. or possibly 1 inch in thickness. I understand that Mr. Anderson, the Chief Assistant Engineer in South Australia, gave members of the committee a demonstration of the driving of spikes to fasten 80-lb. rails in mixed gauges, and I suggest that this operation under test conditions, and possibly with picked men may not be conclusive, nor would it demonstrate the effectiveness of a spike after the rail had been in operation for some time. Usually fishplate bolts are inserted from the inside and tightened on the outside of the rail, but there is no hard-and-fast rule. The standard fishplates are designed to give added breadth to the flange of the rail to give compensating lateral strength at a point otherwise weak, and because of such breadth, especially when seated upon a sleeper, to better resist the tendency of the rail to turn under the outward thrust of the wheel flanges. The limited space between the rails would require some reduction of the lateral strength of the standard fishplates in the case of lighter rails, and a considerable reduction in the case of 100 lb. Australian standard rails where such support is most needed. Therefore, it would not be good practice to pare down the fishplates, because this would militate against the safety of the line. Traffic and constructional requirements will probably contraindicate any saving by reduction of the weight of the external rail serving the State requirements only. If the State traffic is lighter it might be urged that the rail to carry the State traffic only could be a somewhat lighter section, but this would lead to constructional difficulties at points and crossings, where any difference in the height or section of the rails employed would introduce an element of danger that must outweigh any economy in construction. The world-tendency is to increase the weight of rail in the interests of safety and economy. In the United States of America (*vide* Interstate Commissions report for 1923) the average weight for all lines has reached 84 lb. per yard. Any future increase in rail weight or breadth of flange or head would make the difficulties of the three-rail system more acute. I understand it is the intention of the South Australian Railway Commissioner to relay portion of the track as far as Salisbury with 100-lb. rails, and I believe the Commonwealth Railways Commissioner proposes to increase the weight of locomotives on the East-West line to improve the nature of the service. The necessary corollary to increased weight of locomotives is an increase in the weight of rails, and it is not advisable to adopt any system which, while sufficient for comparatively light traffic, might prevent the Government from taking the advantage of the heavier locomotives to get higher speeds. Points and crossings are recognizedly the places of danger, since a loose member can never have the strength of a continuous rigidly secured rail. Also, the function of the points is to deflect a train from one path into another, therefore they must suffice to sustain the haramobley, or impact laterally, of possibly 100 tons moving at high speed. I feel no doubt that the limited space afforded on the mixed system as compared with the practically unlimited space now available would unduly reduce the strength of the elements. It is difficult for the layman to appreciate adequately the difficulties of mixed gauges even when trains are crossing points at 20 miles an hour, and I have seen this done at speeds of 50 miles and 60 miles an hour. A locomotive, when crossing points, is deflected approximately 6 inches in perhaps one-fifth of a second. This is equivalent in energy to a fall of 1 inch on to the rails. To increase safety it may be necessary to provide for at least five or six times this amount of impact. Inevitably there will be an increase in the number of accidents at points and crossings owing to the reduction in the margin of safety. In many places trains are permitted to run through station yards at 30 miles an hour. I know of no place where they are permitted to run at greater speed, but, speaking as one who has studied railway practice, I know that regulations cannot always be relied upon, and that nearly every railway disaster may be traced to some breach of regulations. I have seen men take locomotives over points and crossings at 50 and 60 miles an hour, and one cannot say that it will not be done again. It is necessary to protect the public against the infraction of regulations. One has to take things as they are, not as they should be. I submit that an academic belief that safe points can be constructed to meet the requirements is not a sufficing basis for action, and that the construction and rigorous testing of points, and the establishment beyond doubt that they can be as strong and not less durable than the normal appliances, should be a condition precedent to the acceptance of any proposal including their use. It would not to me be sufficient for a man, even a high authority of great experience, to say, "I can make a set of points to meet all requirements" Were I a railway administrator, my reply to such a statement would have to be, "It may be so, but you must demonstrate it to me. I must have an opportunity of testing the appliance under the most rigorous conditions. Life will be at stake on the points and crossing that you affirm you can construct" With a third rail the number of points and crossings upon a given route would be doubled, hence—(*a*) The points of potential weakness and danger would be doubled; also (*b*) the number of signals to be observed, and that might be disregarded, would be doubled; also (*c*) the intricacy of the interlocking mechanism would be more than doubled; (*d*) the mental strain upon station and running staff would be increased. It is one thing to run a train over a set of crossings on a fine day in daylight, but it is another thing for a train crew, after a trying trip, to run into sleet or fog on a dense dark night, and not to be sure whether they are within half a mile of points or of a signal. The strain is real and severe, and anything that relieves it in railway practice is desirable. It may be contended that these matters would be more pronounced in their incidence upon the State than upon the Federal traffic.

There may be less danger to Federal express traffic than there would be on the State 5 ft. 3-in. gauge, but this would not be so unless it could be shown that in volume, weight, and speed the Federal traffic would be, and would continue to be, proportionately less than the State traffic. The value of a passenger's life and safety is obviously the same in either case. Let it be assumed that the Federal authorities are to run only one express over the line. There is no evidence that I am aware of to show that they may not be running a fairly heavy traffic over the line before its life has expired, and in that case the contention that the danger would be less on the Federal line than on the State line might not be sound. One of the outer rails would be unsevered, the other outer rail would be severed to allow deflection of the traffic, but in a way that is common to ordinary railway points and crossings. One may assume that in the outer rails there is no reduction of strength, in fact, there would be less strength in the Federal rail or intermediate rail, which must be cut to allow of the crossing of the State traffic also I am speaking, of course, only as to the strength of rails. The question of the complication of points and crossings is another matter. Dealing with the rails between stations, there is nothing material to differentiate the strength of the two gauges. As far as the risk of accident is concerned, I should say that eliminating points and crossings from consideration, and regarding only the straight track, the danger of accident caused by the third rail would be equal on both gauges. At points and crossings there may be, but I should like to analyze it carefully before committing myself, a slight but not a determining greater safety on the Commonwealth gauge. The use of a third rail at present is localized, and limited under special supervision to a traffic relatively slow, or slowed down to meet the disability. These are not the conditions that apply in the case of high speed, heavy express working over hundreds of miles or more of track. The third rail is worked under conditions of special attention and comparatively slow speed. My previous answers apply to the running of quick heavy traffic over third rail sections even where points and crossings are not concerned. The danger arising on an express track from the narrowness of the space between the rails does not apply at such places as Wodonga, Tocumwal, and Snowtown. There certainly would be an increase in the cost of laying a third rail track there, but I could not say, without a fairly complete analysis, whether that increase would be material. I submit that such matters can only be effectively determined by consulting departmental records which have not been made available to me. Speaking from the point of view only of theory, it is clear to me that there must have been greater cost in the laying and maintenance of a third rail, but that extra cost might not be such as to contraindicate the laying of the third rail. I should not consider the increased cost in the comparatively few yards and crossings as an important element, either for or against the economy of a system as a whole. Such increased cost would be a relatively small percentage of the cost of the whole. Of my own knowledge I do not know of any accident that has occurred, or of any difficulty that has been experienced, in connexion with the use of the third rail at any of those places. The records should disclose the facts. I was informed that during the tests at Tocumwal there was a derailment, or derailments. One of the engineers who made the tests was my informant, but the evidence is hearsay. I have not had an opportunity to peruse the evidence submitted to the Committee that it is only where stations with points and crossings and interlocking occur that difficulty arises with the third rail, but would join issue, for the reasons above adduced, on any such statement. I have no doubt that the third rail would increase the danger of running at all places throughout the route. The statement that, with proper care and working, and the adoption of suitable points and crossings and interlocking devices, no risk will be entailed, has not been referred to me, and I have been verbally informed that actual points and crossings, or their plans and specifications, are not available for inspection. I would join issue upon the statement as conveyed in the question, for the reasons already set forth in the preceding answers. Such statements may rest upon failure to differentiate between appliances and systems that cause, or would cause, immediate failure, and others such that, whilst they do reduce the standard of safety and therefore increase the average life loss, may fail only under a combination of circumstances of infrequent occurrence. One derailment of an express in ten years above the normal accident rate would be an example of the latter type. Accidents seldom occur from one cause. They generally happen as the result of a combination, frequently an unpredictable combination, of causes. Provision may have been made to deal with, say, each of three probable causes of accident, but when the three happen concurrently, disaster results. It is quite possible to design and construct a device that will operate for a considerable time with apparent safety, but it is also possible that it may contain in itself elements of weakness. The designers may have overlooked something that only the test of experience would reveal, and at some time unforeseen circumstances may arise to cause the apparently satisfactory mechanism to fail. Experience has taught that all the combinations of detrimental conditions cannot be predicted, but that unexpected combinations do arise, and that the sole safe rule is never to reduce a tried standard of safety, never to introduce a danger. World-practice is in the direction of increasing safeguards, never of reducing them, and of eliminating potential dangers, never of introducing them. I submit that an increase of danger by the use of a mixed gauge in the conditions existing here is obvious, and that possible economy in first cost, at the expense of probable loss of life, is not justifiable. I have been taught never to consider anything that would give apparent economy if at the other end of it there was probable death. The building of an additional track from Port Augusta to Adelaide would be expensive. Assuming that the additional cost would be as estimated, £600,000, it would involve an annual interest charge of £36,000 at 6 per cent. per annum. One accident a year might swamp that, and even the loss of one life might do so. An accident on this line would presumably be an accident to an express. The loss of life, involving compensation for injuries, legal costs, and concealed as well as obvious costs, might wipe out the savings of four or five years. I understand the gravity of the position from a financial point of view. I can understand that it is the function and duty of lay administrators, both State and Federal, to carry out public works at the least possible cost, but I am speaking as a railway engineer, whose first duty is to protect life. If an administration accepted the position which, I understand, is sometimes accepted in the United States, of one life so many dollars, that is their affair, but I cannot accept it. It is against my training. Think what a bad advertisement it would be to have even one derailment of the transcontinental express.

216A. *To Mr. McGrath.*—It is not to be inferred that I speak as a Victorian. I speak as an Australian who has frequently handled matters when State must be subordinated to Federal interests. For instance, I was one of the two men who selected the plan upon which the Federal Capital is being built.

require a high tractive effort. As a rule, the engine wheels are much more heavily loaded than the wheels of rolling-stock. Speaking in general terms, the weight upon the locomotive wheel is the determining factor. Truck wheels are designed so that the load upon them shall be considerably less than the permissable load upon the locomotive driving wheels. The volume, as well as the weight of the traffic, has to be considered. If there were ten Federal trains a day, as against one State train, the wear and tear on the Commonwealth line would be the greater. On the other hand, if there were ten State freight trains a day, and only one Commonwealth passenger train, the strain would be on the 5-ft. 3-in. line.

220. *To Senator Lynch.*—My father was early associated with the Stockton and Darlington railway, in Great Britain, and I am familiar by tradition with the conditions and the unwritten history of early railway practice in England. When the House of Lords Committee decided on the 4-ft 8½-in gauge, the several railway companies, with the exception of the Great Western company, faced the position and unified the gauges. The Great Western Railway had a 7-ft. gauge. Special provision was made by the Committee of the House of Lords to permit that company to use a third rail. As far as I know, the three-rail proposition did not come into operation until a number of years afterwards, and then only in a moderate way. Ultimately when the Great Western line, not very long ago, decided to unify, the whole of the traffic was stopped for an exceedingly short space of time. I think something over 20 hours during which the 7 ft. gauge was altered to 4 ft. 8½ in. Before they were unified there were a number of gauges in use in Great Britain and the United States. In some cases the gauges differed by only an inch, or a fraction of an inch, and in such cases the use of the third rail was not possible. Even where it was possible, however, it was not used. Evidence in regard to India, where 5-ft. 6-in. and 3-ft. 6-in. trains are run over the same route by means of a third rail is worthless in relation to the proposal to run 5 ft. 3 in. and 4 ft. 8½ in. gauge trains over the same route. There are very few instances where check rails are used on curves. They are used in yards where there are points and crossings, or where a curve leads to a bridge, or is unduly sharp. In general, the check rail is used only in exceptional cases, and seldom over distances of more than a few lengths of rail. In my experience the check rail is not used over an extended length of track. A short length is capable of special supervision by gangers, but the necessary supervision is not insurable over hundreds of miles of track. The check rails have no bearing on the strength or weakness of movable tongue points. They do not enter into that phase of the problem. So far as they enter into other phases of the problem it is not a question of the check rail which is in ordinary practice a safeguard—being converted into a danger when employed as a third rail. The check rail is so spaced that there is only space for the flange of the wheel to move freely between it and the running rail. The safety arises because of the closeness of the two rails. There is not that closeness in the proposed third-rail scheme. Apart from that, it has to be remembered that a device may be safe, and in the case of the check rail is safe, in a limited application under careful supervision, but it is not equally safe over long distances. The most important consideration in making a comparison between a check rail and a third rail is that trains are never run on a check rail. Where check rails are used on sharp curves, the speed of trains is regulated. I do not agree that the danger if the third rail is employed would be greater to the trains on the wider gauge, except at points and crossings where a greater number of point changes have to be made in regard to the State than the Federal service. There are so many more points of possible failure that the danger is greater to the State than to the Federal service, but it is sufficiently great in both cases, inasmuch as the operations must be interlocked, and any failure in interlocking and signalling in one service may lead to disaster in either service.

221. *To Mr. Cook.*—In the ballasting of sleepers there is a greater distance concealed if a third rail is used, and a greater amount of packing would have to be done by feeling. I think the workmen could be habituated to that. The weight is distributed at one end of the sleepers, but is concentrated at the other end, and thus greater care would be needed in packing the sleepers. I do not think that disability is material, and I would not stress it. It would tend to less smooth running and to increasing the cost of maintenance, but I would not say that these matters alone would contraindicate the adoption of the system. Long stretches of closely spaced rails would lessen the opportunity for necessary inspection. Any relaxation of inspection means in actual running, not necessarily an immediate accident, but an increased liability of accident, and over a number of years an increase in the number of accidents and in the loss of life. I have no doubt that the closeness of the rails, apart from points and crossings, will introduce an element that will lessen the safety of the line.

222. *To Mr. Gregory.*—The first principle, undoubtedly, in railway engineering is the safety of passengers. My training, and perhaps my inclination, has led me to take up the position that in no circumstances would I lessen the provision for safety that the experience of those who have gone before me has shown to be essential. The use of the third rail for 3-ft. 6-in. and 5 ft. 3-in. gauges would not increase the danger to the same extent as it would for 5-ft. 3-in. and 4-ft. 8½-in gauges. The modern tendency is greatly to increase the weight of rails used on railways. I believe that 90-lb. rails are used in Victoria, and from 90-lb. to 100-lb. rails in New South Wales. I read the report of the Break of Gauge Commission, and tried to read in it the minds of the commissioners. They were entirely definite in their finding that while in the transition work the combined gauges of 4 ft. 8½ in. and 5 ft. 3 in., or possibly 4 ft. 8½ in. and 3 ft. 6 in., might be used, they could not consider it applicable to any extended mileage. That conveyed to me with great clearness that they intended the third rail to be used only for short lengths of mileage, under conditions of special supervision, but not in any circumstances over long lengths of line. I deduced from the wording of the report that the Commission anticipated that some such suggestion as that now before the Committee might be made, and they intended to place on record their opinion that the third rail should not be adopted. I do not think I am justified in regarding the proposal before the Committee as a temporary expedient, unless it is proposed as a corollary to limit the speed of the expresses to 10 or 15 miles an hour. If it is proposed to run the expresses at express speed, I cannot class the proposal as a temporary expedient. The unification of the gauges is in the lap of the gods. If the Committee can save £600,000 by employing the third rail, consequential costs may ultimately be as great. The possible saving will be at the cost of an increased risk to life. The issue is whether the committee is justified in saving £600,000 and jeopardizing life. As a railway engineer, I do not consider that the saving, in the circumstances, would be justified. I would not consider adoption until I had exhausted every alternative—probably not then. If there are alternatives they should surely be considered. One alternative, I understand, is the building of a duplicate line, which, I understand, would cost £600,000. That alternative would be effective, and it is merely a question of balancing money against life.

(Taken at Melbourne.)

THURSDAY, 18TH MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.
Mr. Gregory	

George Alexander Hobler, Chief Engineer of Way and Works, Commonwealth Railways, recalled and further examined.

223. *To the Chairman.*—In every case where a third rail is used the rails throughout the whole length of the line must be of the same weight. If 100-lb. rails are used there will be only three-quarters of an inch space between the flanges. That space will be sufficient for dog spiking. The diameter of the standard dog spike is ¾-in. That is the latest standard which we are now adopting for the Australian railways. It would not be necessary to use a smaller dog spike, because there is ample room for the use of the ¾-in. dog spike. To meet the contingency of the use of heavier rails in the future, Australian engineers have now prepared a standard 110-lb. rail. That will meet, for a great many years, any extra axle loads that are found to be necessary. These 110-lb. rails could be used with the addition of a third rail. The width of the head and the base of the 110-lb. rail will be the same as those of the 100-lb. rail. The additional weight is in the depth and the width of the web. The standard sleeper in South Australia is 8ft. 6in. by 10 inches by 5 inches. The Commonwealth standard of sleeper on a 4-ft. 8½-in. gauge is 8 feet by 9 inches by 4½ inches. That is also the standard sleeper adopted in New South Wales. The standard adopted in South Australia is 8 ft. 6 in. by 10 inches by 5 inches for the 5-ft. 3-in. gauge. Some of the sleepers are 9 feet and some 8 ft. 6 in. long. The South Australian Railways Commissioner has agreed to use 8-ft. by 9-in. by 4½-in. sleepers for laying the road around the station yards between Red Hill and Salisbury. I cannot express an opinion on the question of whether there is any necessity to run around all stations until I see the working plans prepared by the South Australian officers. We are hardly able to say whether they intend the line to run through or around stations. That is a matter rather for the South Australian Commissioner. If he can design a safe method of running through crossings, well and good. The Commonwealth estimate for the provision of a third rail from Red Hill to Adelaide is £380,000. The South Australian estimate is £450,000. The Commonwealth railways' original estimate was £400,000, but a reduction of £20,000 was made subsequently on account of the amendment of the agreement under which South Australia will construct the platform at Adelaide and lay the road leading to it, the Commonwealth providing only the third rail. Details of the reductions in the South Australian estimate as made by the Commonwealth are as follow:—On item No. 1: 4-ft. 8½-in. gauge line around stations and sidings not including at Adelaide station, the amount of reduction is £7,241. This is accounted for by a deduction of 6½ per cent. stores charges, reduction of number of sleepers, and of quantity of ballast to comply with the Commonwealth standard, and also a deduction of 1s. per lineal yard in the cost of platelaying. I might explain that the South Australian railways' estimate of £450,000 includes the 13 miles of line which is the extra length of line required to run around stations. That estimate included the South Australian standard sleepers of 8 ft. 6 in. by 10 inches by 5 inches, with 10 inches of ballast under the sleepers, and 2,376 sleepers per mile, as against the Commonwealth standard sleepers of 8 feet by 9 inches by 4½ inches, with 6 inches of ballast under the sleepers, and 2,244 sleepers per mile. The South Australian Commissioner has accepted that standard for the Red Hill to Adelaide portion of the work, and has advised the Commonwealth Commissioner to that effect. I shall not say that the South Australian standard of railway construction is superior to the Commonwealth standard, but it certainly is stronger. I infer that the South Australian Commissioner has been led to adopt that stronger standard because he is at present introducing engines of a stronger axle load than we are likely to require in the Commonwealth railways for many years to come. It is open to the South Australian Commissioner to run the line through station yards instead of running around them, if he can produce a plan showing that it is sufficiently safe to do so. That plan has not yet been produced. The estimated saving of £7,241 by running around stations would be made because of the lighter standard of line which the South Australian Commissioner has agreed to use should it be decided to run around instead of running through stations. If it be decided to run through stations, it is quite possible that there will be a still further reduction of the estimate. On the item of laying the third rail on the 5-ft. 3-in. gauge, not including at Adelaide station, is a reduction of £12,291. That reduction is accounted for by a deduction of 6½ per cent. stores charges, a reduction of 6d. per lineal yard in platelaying, and also a reduction of half a mile of the third rail to be laid. That half a mile is the distance between the Torrens River and the main platform at Adelaide station yard. The Commonwealth decided that half a mile because a special estimate was given which included the whole of the operations in the Adelaide station yard. That special estimate has already been included in the estimate of £450,000. The South Australian Commissioner has agreed to these alterations, but not so far as the reductions in the cost are concerned. Some miscellaneous items amount to £940, and these are also included in the special estimate for the Adelaide station yard. The next item showing a reduction is the freight transfer yard, for which the South Australian estimate is £10,000. The Commonwealth has estimated only £2,000, which means a reduction of £8,000. We do not know where that freight transfer yard will be situated, but it will be used for transferring goods. There is also a reduction of £3,000 in the item of land required. For that the Commonwealth allowed £15,000, as against £18,000 allowed by the South Australian railways. I have not the details of that estimated saving. Land resumption is a very difficult item to estimate. There is special provision in the estimate for unforeseen expenditure, so that if we are short on that item we shall be able to make it up. On the percentages allowed in the estimate for plant and supervision there is a reduction of £7,204. That is the difference in percentages allowed for plant and engineering supervision on the South Australian and the Commonwealth estimates. That is accounted for by our total estimate being smaller than theirs. The total cost of our estimate, before allowing for contingencies, is less than that of the South Australian railway officers. We allow the same percentages as they do, but our total for the estimate being less than theirs, it follows that the percentages allowed for plant, supervision, and engineering charges are less. The difference is £7,204. A check will be kept of all the work. We shall audit all South Australian railway accounts, and keep a reasonable supervision of the work as it proceeds. The actual estimate of the South Australian Commissioner was £428,450. He added to that amount a sum of £21,550, bringing the total estimate to £450,000. The Commonwealth estimate was £389,774, and to bring that up to a round figure, and to allow for unforeseen expenditure, an amount of £10,226

was added An extra amount of £11,324 was therefore allowed by the South Australian Commissioner, to bring the estimate to a round figure of £450,000 The items I have enumerated show a total difference of £50,000 between the two estimates. To that must be added the £20,000 by which the Commonwealth estimate was reduced in consequence of the South Australian Commissioner undertaking to bear the cost of constructing the main platform in the Adelaide station yard. The estimate for the third rail between Red Hill and Adelaide is more expensive than between Red Hill and Port Pirie, because of the complication arising from running through or around stations. The system of signalling on the latter section will be much cheaper than that between Red Hill and Adelaide, but quite effective. The £15,000 allowed for land in my estimate is a lump sum estimated after investigation of the plans, but until the working drawings are made details will not be available. We anticipate being able to keep generally within the present railway boundaries, and thus avoid in such places the acquisition of additional land. The telegraph line from Port Augusta to Red Hill, for which £10,530 is estimated, is for railway purposes only. The Postal Department has so many telegraph lines in that district that it would probably have no interest in the line which the Railway Department proposes to construct. The provision of £7,000 for housing accommodation for employees is based on an estimate of wooden cottages, costing approximately £750 each. The number of cottages that will be required cannot be determined until we know how many men will be employed in the fettling gangs. From Red Hill to about the 17-mile peg, going towards Port Pirie, the route adopted by the Commonwealth followed very closely that recommended by the State Parliamentary Standing Committee on Railways The residents of Wandearah asked that the line should be deviated through Munday's Gap in order to bring it nearer the school. Our objection to that proposal is that it would alter the general direction of the line and involve heavier earthworks. If the line were diverted through Munday's Gap, and taken along the 3-chain road into Solomontown, we should have to construct an extra 2½ miles of line, at a cost of £20,000, and add approximately £200 per annum to the maintenance bill. The present route has been agreed to by the Commonwealth and State Commissioners. The deviation towards Solomontown would not involve actual engineering difficulty, but the line would have to be run some distance back from Port Pirie towards the east in order to get away from the town. We should have to pay a greater amount of compensation in respect of land, and no useful purpose would be served. The Commonwealth railway station at Port Pirie will be sufficiently convenient for the passenger traffic. The residents of Crystal Brook have protested against the deviation of the line, and suggest that the original Commonwealth route would be shorter. It would not be advisable to adopt the shorter route. It is possible that if we were considering only the interests of the Commonwealth railways we would avoid Port Pirie, and run the line through Crystal Brook to Port Augusta, but as the Commonwealth desires to lay a third rail from Red Hill to Adelaide, it has to study the convenience of the State authorities by swinging the line in towards Port Pirie That is provided for in the agreement. In regard to the route nearer the coast, suggested by the residents of Port Germein, I decided after my inspection of the route with this committee that when a surveyor is available to peg the permanent route we shall consider going nearer to the coast than the present surveyed line. Having been over the route suggested by the Port Germain people, I think it is worthy of consideration, but I am not prepared to give a definite opinion until a surveyor has taken a section through the country. Since the third rail was installed at Wodonga the standard material has been altered, but that would not affect to any great extent the rails laid there. By visiting that place the committee will get an idea of the method of laying a third rail, but it would require to take into consideration the fact that there the third rail is only in a shunting yard, whereas the proposal now under consideration is for a line to carry through passenger traffic. I have no doubt that the Wodonga installation would convey an impression to the committee that it is possible to provide a 4-ft. 8½-in. gauge inside a 5-ft. 3-in. gauge by laying a third rail.

224. *To Mr. Lacey.*—The South Australian Railway Department is responsible for the estimate of 13 miles for construction around stations. That allowance includes about 1½ miles of sidings to the abattoirs and the Commonwealth carriage shed near Adelaide. The estimate submitted by the State is based on the State permanent way standard, whereas the Commonwealth estimate provides for the use of the Commonwealth permanent way standard. The difference in these standards is mainly responsible for the variation in the estimates. As the State Commissioner has agreed to build that 13 miles of line to the Commonwealth standard, he would be justified in reducing his estimate accordingly. The reduction of 6d. per yard in some cases and 1s. per yard in others which I have allowed for platelaying relates principally to labour. The calculation is based on our standard of work. We have estimated the amount that we would provide if the work were being carried out by the Commonwealth. The freight transfer yard, for which we have allowed £2,000, and the State £10,000, relates to a long platform that will have the 5-ft. 3-in. line on the one side and the 4-ft. 8½-in. line on the other. The wagons will be on opposite sides of the platform and the goods transferred across from one gauge to the other. The State estimate provides for the yard to be at Red Hill. We consider that a better situation may be near Adelaide, but no decision upon that point has been reached. In any case, we estimate that £2,000 would be sufficient for the work. The point at which the goods will be transferred is a question of policy, to be decided by the Commissioners and I can express no opinion upon it. Probably an officer will be appointed to watch construction work on behalf of the Commonwealth, and in addition all accounts will be audited by the Commonwealth.

(Taken at Melbourne.)

FRIDAY, 19TH MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Reid	Mr. Lacey
Mr. Gregory	Mr. Seabrook.

George Alexander Hobler, Chief Engineer of Way and Works, Commonwealth Railways, recalled and further examined.

225. *To Mr. Lacey.*—If the proposed line is taken along the 3-chain road from Red Hill to Port Pirie, the extra length will be 2¼ miles. There are no engineering difficulties on the 3-chain road, but we would still have to take frontages off adjoining farms, and in three cases, owing to the bending of the road, we should have to cut into three farms practically to the same extent as on the surveyed route. The South Australian Government will not allow us to take the whole of the 3 chain road for railway purposes The location of the line at Port Pirie has been determined by the two Railways Commissioners. Should it be decided to take the line nearer Port Germein, a surveyor will go over the alternative route, and give a section of the altered location. I doubt if a visit by members of the committee to Wodonga will be of any value from the point

of view of the working of points and crossings under the third-rail system, but members will be able to see two 80-lb. rails laid side by side in mixed gauges. The railway practice now is to "stagger" the fish-plate bolts. In the event of a derailment, the nuts, if they were all inserted from the one side, would be cut off by the flange of the wheels. By "staggering" the bolts the risk is minimized. Only a certain number will be cut off, and the remainder will hold the fish plates to the rails. There need be no difficulty in inserting the bolts in the fish plates of rails laid on the mixed gauges. The practice is to put the fish-plate bolts in before the rails are pulled into position.

226. *To Mr. Gregory.*—I was not consulted about the policy regarding the third-rail principle between Port Pirie and Adelaide. I was not in Australia when that matter was decided. My instructions were to carry out the survey, and prepare plans and estimates in accordance with the policy determined by the Commonwealth and State Railways Commissioners. I had nothing to do with the agreement. The advantages claimed for the proposal were fully set out in evidence given by Mr. Bell, Commonwealth Railways Commissioner, before the committee on 3rd February last. The principal advantage, was the saving of time in the transport of passengers and the carriage of mails and goods from the transcontinental line at Port Augusta. I could not say off-hand if I would recommend the third-rail proposal if there were in existence a 5-ft. 3-in. railway from Port Augusta to Adelaide. Delays and transfer problems due to a break of gauge concern the traffic branch. I have some knowledge of the inconvenience and delay caused by the breaks of gauge, but no detailed information. A proposal to extend the 4-ft. 8½-in. line from Port Augusta to Red Hill, and make the transfer to the 5-ft. 3-in. line at Red Hill, must necessarily be determined by the Commonwealth and State Railways Commissioners. Personally, I do not think it would be as satisfactory as this scheme to bring the 4-ft. 8½-in. line into Adelaide. It would nullify the advantages claimed for this proposal by the Commonwealth Railways Commissioner in his evidence before the committee in February last. I have had considerable experience both as an engineer for construction and an engineer for existing lines. My experience of the third-rail principle is confined to certain small sections where it is used more for shunting purposes than for passenger traffic. In my opinion, the mixing of the 4-ft. 8½-in. and the 5-ft. 3-in. lines does not necessarily mean a greater risk than the mixing of 3-ft. 6-in. and 4-ft. 8½-in. lines, but the latter certainly would be more convenient, especially at points and crossings. I do not think that the third rail introduces a greater element of danger than the guard rails, which are used very extensively at all sharp curves where there is liability to derailment. Railway regulations limit the speed of all trains rounding curves. Drivers are expected to observe the regulations. It is anticipated that the construction of the new line will allow of a greater speed being attained between Port Augusta and Adelaide. The regulations govern the speed on all curves where guard rails are fixed, but from Red Hill to Adelaide there are practically no curves, and a high speed should be maintained. It is proposed to relay with 100-lb. rails the line between Salisbury and Adelaide. The use of the heavier rails will not increase the difficulty of fixing fish plates and bolts in adjacent rails. We have gone very carefully into that matter. There will be no difficulty even with 110-lb. rails, because the base and head of both 100-lb. and 110-lb. rails are the same. The space between the heads of adjacent rails laid on the 5-ft. 3-in. and 4-ft. 8½-in. gauges will be 3½ inches, and there will be no greater danger of débris lodging between rails so laid than there is between existing lines of track and the guard rails. I am satisfied that the third rail does not introduce a new element of danger in railway working, but naturally I would prefer the unification of the whole of the gauges in Australia. I am certain that eventually we must unify the gauges. The Commonwealth standard sleeper, 8 feet by 9 inches by 4½ inches, has been accepted by Mr. Webb, the South Australian Railways Commissioner. We propose to use 6 ft. 6 in. by 9 in. by 4½ in. on the section between Red Hill and Port Pirie, because that will have to carry the third rail for the 5-ft. 3 in. line from Red Hill into Port Pirie. We intend to use 6 inches of ballast as against 10 inches of ballast, the South Australian standard for their high speed lines. I am conversant with the practice in Western Australia of using a bituminous substance to tighten up dog spikes that have loosened in the sleepers of lines which have been laid for a certain time We have carried out experiments on similar lines, but up to the present the results have not been altogether satisfactory Mr Gahan, the chief mechanical engineer in charge of our Port Augusta workshops, is also engineer for maintenance on the transcontinental line

227. *To Senator Reid.*—The standard dog spike for all rails from 60 lb to 110 lb is ⅞ in dogs with square necks Formerly it was the practice to use dog spikes of different diameters for varying weights of rails, but we have now adopted a standard dog spike for all classes of rails. The recognized railway practice now is to "stagger" the bolts in the fish plates The head of the bolt being round, the flange of the wheel, in the event of a derailment, will slip off it, but the nut being octagonal receives the full impact of the flange of the wheel, and the bolt is liable to be cut off. If all the bolts were inserted from one side, there would be a risk of all the nuts being cut off, and the fish plates would fall away from the rail. By "staggering" the fish-plate bolts we have two nuts and two heads on each side of the rail, so that the danger of a fish plate falling away from a rail in the event of a derailment is minimized. It is not practicable to make the nut the same shape as the head of the bolt. It would not be strong enough, and we could not put the same threads in it. I anticipate that the transfer yards will be at Adelaide, but this is a matter for the Railways Commissioners to determine. We shall supervise all the work done under the agreement by the South Australian Government for the Commonwealth railways We will pay the actual cost of that work. The State Government will not allow the third rail from Red Hill to Adelaide to be laid by contract, because it is an open line Contractors are not permitted to do that class of work Every consideration has been given to the possibility of flood waters inundating the line, and where deemed necessary provision has been made against this contingency. It will not be possible to take Commonwealth railway trucks on to the Port Germein jetty, as the structure is too weak to stand the strain. I doubt, even were railway facilities provided on the jetty, if it would lead to any substantial increase in traffic over the line between Port Augusta and Port Germein.

228. *To Mr. Seabrook.*—We have no information at present of the number of stations likely to be required between Red Hill and Port Pirie This will be a matter for the South Australian Railways Commissioner to decide. For an ordinary country station the area of land required is from 10 to 15 acres. I estimate that the maximum price on the proposed route will be about £8 an acre for unimproved land. No land will be required by the Commonwealth between Red Hill and Adelaide until we get down to Salisbury. I think the amount, £15,000, provided in the Commonwealth Estimates will be sufficient for all station land needed. It is exceedingly difficult to say what the actual cost of this land will be, because no one can tell what claims may be made by land-owners when the South Australian Commissioner serves notices of resumption for railway purposes. The Commonwealth railway standards have been accepted by the South Australian Railways Commissioner. On 27th April, 1925, the Commonwealth Railways Commissioner wrote to the South Australian Commissioner advising that between Port Pirie and Red Hill he intended to use 80 lb. rails, with 8 ft 6in x 9 in. x

4½in. sleepers laid 2,244 to the mile, with 6 inches of ballast under the sleepers, bridges and culverts to carry Cooper's "E" 50-ton loading in accordance with Australian standards adopted in 1923. On the 6th May, 1926, the South Australian Commissioner replied stating that he had noted the contents of the Commonwealth Railways Commissioner's letter, and was adopting the same standards for the Red Hill to Adelaide portion of the work. That is how the matter stands between the Commonwealth and South Australian Railways Commissioners. We still have to peg the final location between Port Pirie and Red Hill. Up to the present only a trial survey has been made. That section will be surveyed and pegged as soon as we receive instructions to proceed with the work.

(Taken at Wodonga.)

SATURDAY, 20TH MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Oliver Clement Hunt, shunter, Wodonga, sworn and examined.

229. *To the Chairman.*—I have been employed at this station for seven years. Part of my duties is to operate the points to enable 4-ft. 8½-in. gauge rolling-stock to be brought into the railway yard at Wodonga. While I am on duty I am responsible for the points. A good deal of traffic is transferred from New South Wales, but we might not have more than half a dozen Victorian trucks in a day passing over the mixed gauge in this yard. The New South Wales trucks are dealt with by a New South Wales shunter. We are supposed to see that the road is clear for him to go to his siding, known as the cattle-race road. An accident occurred there about four and a half years ago. A signalman allowed a New South Wales engine to advance against the points, and he was fined 5s. Apart from that accident, no difficulty has been experienced in connexion with the third rail at this station. The average speed at which trucks pass over it in the station yard is from 5 to 10 miles an hour.

230. *To Mr. McGrath.*—The accident to which I have referred might easily have occurred on a single track and on any line.

231. *To Mr. Lacey.*—Almost every day shunting is done over the mixed line. If a signalman gave the same signal as was shown when the accident occurred, and the circumstances were similar, such a accident might take place on any part of the Victorian system. Any person not familiar with the working of the two gauges on the same track could easily make mistakes. I am usually very careful, and I think that with ordinary care the third rail is safe for shunting movements.

232. *To Mr. Seabrook.*—I have not known a buffer head or broken coupling to fall off a wagon, nor have I known anything to fall from a truck that would be liable to be caught between the two adjacent rails, and cause a derailment.

233. *To Senator Reid.*—No particular objection has been expressed by the men as to the responsibility that the third rail throws upon them as compared with the plain track.

234. *To Senator Barnes.*—I do not think that the device is suitable for any other than ordinary shunting movements. If a third rail were laid for a distance of 100 miles, there might be no difficulties in taking trains through stations, but trouble might be experienced in connexion with shunting.

235. *To Mr Cook.*—When the third rail is employed extra care is required on the part of railway men, and they should be experienced in that particular kind of shunting. Increased care is required at the break of gauge points. You have to be careful that you shift the right points, and the extra care is needed despite the fact that in the Wodonga yard the speed does not exceed from 5 to 10 miles an hour. On one occasion a new shunter was given this work, and because of his inexperience there was trouble immediately. Shunting can be carried out more expeditiously over a single line than over a line having three rails.

The witness withdrew.

Michael Bronock, stationmaster, Wodonga, sworn and examined.

236. *To the Chairman.*—I have been stationed here for fourteen months, and have had 38 years' experience in the Victorian Railway Department. The length of line in this yard over which three rails are laid is about a quarter of a mile. We receive telephone advice from Albury when trains are coming through to this yard. Our signalman would hold a New South Wales engine on its own track clear of the 5-ft. 3-in. gauge. The shunter in charge would indicate to the signalman when the mixed line was clear of all broad-gauge rolling-stock. About 30 trains a day pass through the Wodonga station. Our shunting has been delayed on numerous occasions on account of this third rail. No accidents have occurred since I have been stationed here.

237. *To Mr. Seabrook.*—Our safe working instruments are electrically controlled. The gates and the points are interlocked, and are quite safe. There would be an element of danger in laying the third rail right through the station. At present it comes in at the side of the station. Any article, such as a buffer, falling between the two rails could cause an accident.

238. *To Senator Reid.*—So far as my experience goes, I do not know of any hard substance, such as a buffer, having fallen across the track in that way. The two adjacent rails provide a natural resting place for such an obstacle, whereas with the single rail the danger would be lessened. A bale of wool falling across the line could derail a train, but a bag of wheat or chaff would cause no serious trouble. About four days ago a broken buffer fell on the single track. Had it fallen on the mixed line it might have rested between the two adjacent rails. Of course, the lines are inspected by the gangers every morning, but they are not inspected at night or between trains.

239. *To Mr. Cook.*—The use of the third rail increases the danger of derailment, because of the possibility of objects lodging between the two rails.

The witness withdrew.

Edmund Adderley, engineer, sworn and examined.

240. *To the Chairman.*—My duties are particularly connected with track matters. Wodonga is not under my jurisdiction, but under instructions from the Chief Engineer of Victorian Railways I came here to assist the committee. The points and crossings which the committee has inspected in this yard are not complicated. Two of the sets were, when installed, standard for the 4-ft. 8½-in. gauge, with a rail running outside to form a 5-ft. 3-in. gauge. In my opinion it would be dangerous to run a third rail over a distance of, say, 100 miles, because with the two adjacent rails very close together articles might lodge between them, and cause derailment. I cannot say from memory where the greatest length of guard rails round curves is to be found in Victoria. There is a considerable length over the Yarra flats at Yarra Glen. I have never known of obstacles lodging between the two rails, but brake blocks, buffer heads, and miscellaneous ironwork are not infrequently found along the various lines. This morning the committee saw a third rail arrangement with the nuts on the inside, but the present standard practice is to stagger them, heads and nuts alternately. It would not be possible to stagger the bolts if 80-lb. rails were used, because there would be insufficient room between the two rails to insert the bolts. There is no serious objection to having all the bolts uniform, with the nuts between the rails. If there were a derailment on the 5-ft. 3-in. track I do not think it would be possible for the flange of the wheel to shear off the nuts. The tread of the wheel is already wider than the flange of the rail, and the wheel could not drop down unless the tracks were spread, which sometimes occurs in a derailment. I do not care to venture an opinion as to the average life of the sleepers. We find some to be sound after 50 years' use, while others prove faulty after a short time. Concrete sleepers have not been in use for a sufficient period to enable one to estimate their life. In order to prevent creeping of rails, the use of rail anchors has lately been adopted on the Victorian railways. I understand that creeping has occurred to the extent of 2 ft. 6 in. a year. This would principally be on a steep grade. The ferrule block inspected at Wodonga is used only for short distances where guard rails are employed. We do not use through bolts on the curves because experience has shown that the running rail creeps, whereas the check rail does not. In the case of three rails, there would be irregularity in the creep. I do not approve of the third rail device except at sidings, such as at Wodonga, where it is removed from passenger traffic. It would probably be safe to use a third rail through a station if a speed of 10 miles an hour were not exceeded, but, in my opinion, it would be safer to separate the gauges before reaching the stations.

241. *To Mr. Seabrook.*—The risk of objects jamming between the two adjacent rails and causing derailments increases according to the length of the line. The crossings at the North Melbourne station are all taken at slow speeds. Generally speaking, trains slow down to 25 miles per hour. I am not prepared to say that there would be more risk with a third rail at North Melbourne than on a long straight line. The life of an 80-lb. rail will vary enormously according to the nature of the traffic. On a quiet country line it may last for 50 years, but in a busy station yard, where brakes are frequently applied, its life may not be as many months. Apart from yards, the average life should be 25 years. In the case of repairs to a line having a third rail, it would be very expensive to have to remove the outer rail in order to insert new bolts. It is necessary at times to renew broken bolts. With 80-lb. rails the space between the two adjacent rails is only 4½ inches, and the bolts are 6 inches long, so that it is impossible to stagger the bolts, although the hole is oval, without moving one of the rails. Every time a dog is drawn and replaced the sleeper is damaged.

242. *To Senator Reid.*—My principal objection to the third rail is the danger of objects lodging between the two adjacent rails. It is possible for this to occur, and railway engineers are not inclined to take the increased risk if it can possibly be avoided. Some of the rail anchors have a twist in them. You have to bend that twist out temporarily when you drive them on, and then they grip. They are nearly all constructed so that the greater the force of the rail towards the sleeper the tighter they grip. My experience of them is mostly in the suburbs. To what extent they are used on country lines I cannot say. It is largely a question of whether the department can supply them at a sufficiently rapid rate to meet requirements. It would be very difficult to apply the rail anchor to a third rail proposition. Some kinds could be used on an 80-lb. rail, and others could not be put on at all. I doubt whether an anchor could be employed on a 100-lb. track, because of the shorter distance between the two adjacent rails.

243. *To Senator Barnes.*—I have had no railway engineering experience outside the railways of Australia. Theoretically I consider that there is more danger with a third rail than with a plain track.

244 *To Mr McGrath* —My experience of the third rail is its use as a check rail. I have never known any article to lodge between the two rails. I cannot tell you how many buffer heads fall off trucks in the course of a year, but I have seen half a dozen lying about the tracks. The instructions to the men are that any such material must be picked up and returned to the depot. We have had experience of wheels buckling, and I strongly suggest that the danger to the public should not be increased. My objection to the third rail is based on theoretical rather than practical experience of it.

245. *To Mr. Cook.*—I hardly think that the cost of upkeep would be greater with a third rail than with two. I object to it largely on the ground that I believe in safety first. Under existing arrangements the risk of accident is sufficient, and the introduction of a third rail would add to it.

246. *To Mr. Lacey* - Good sleepers, such as ironbark sleepers, will stand re spiking more than once. The packing of a spike is merely a temporary expedient. The creeping of 2 ft. 6 in. in a year to which I have referred took place on Oliver's Bank, near Pascoevale. There the road is very steep. On a reasonably level track, where no braking takes place, the creep is negligible. If the Red Hill line is practically level, the creep would be very slight, but I point out that when approaching stations brakes are always applied, and creeping has been caused even on uphill roads owing to the application of brakes. We have a rail anchor, with which experiments are now being conducted, which could be fixed on the outside of the 5-ft. 3-in. line if necessary, and on the inside of the 4-ft. 8½-in. rail. This, if proved to be satisfactory, would prevent the whole of the creep.

247. *To the Chairman* Special rails, 3 in. and 4 ft 8½-in. tracks were laid for the purpose of the experiment at Tocumwal. The trial went off satisfactorily with the exception of one derailment, which was caused through the vehicle being moved when the points were set against it. Quite fair speeds were tried in that case, but the engineers present reported against the use of the third rail for reasons similar to my own. There was a set of points similar to the transfer points inspected by the committee to-day. While these appliances are new there may be no risk, but after they have been in use for six months there may be very grave risk, because in crossing work no points can be maintained 100 per cent. efficient. Greater risks are incurred in using third rail points than ordinary points. The Tocumwal trial was conducted solely by the New South Wales Railway Department, although Victorian and other railway engineers were present as visitors. Constructional methods in regard to points and crossings have not altered to any considerable extent since that time. For main line working we would not consider third rail points. The flange way is too narrow to permit of a proper throw of the blades or the insertion of a full strength standard blade.

(Taken at Sydney.)

MONDAY, 22ND MARCH, 1926.

Present.

Mr. MACKAY, Chairman,

Senator Barnes	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.

Charles Wright LeNeve Foster Wilkin, Interlocking Engineer, New South Wales Railways (retired), sworn and examined.

248. *To the Chairman.* I was interlocking engineer in the New South Wales Railway Department from 1891 to 1913, and I held a similar position in South Australia from 1882 to the end of 1890. I have had experience of every railway in England, particularly the Great Western line, as well as experience on the continent of Europe and in other parts of the world.

For 37 years, that is from 1855 to 1892, a third rail was in operation on the Great Western line, over which trains ran at speeds that will never be attained in this country, namely, from 60 to 80 miles an hour. I suppose that the heaviest rail in the early days would be one of about 70 lb., although latterly a heavier rail has been employed. The gauges that were mixed were 7 ft. 0½ in. and 4 ft 8½ in. For the last thirteen years I have devoted the whole of my time to the problem of unifying the 5-ft. 3-in. and 4-ft. 8½-in gauges, because, so far as my experience goes, and from what information I can gather in other countries, the combination of these two gauges has never been attempted on the third rail system. There is only a space of 6½ inches between the running faces of the two contiguous rails, and the ordinary crossings and switches are not applicable. A special arrangement has to be devised, and that is what I claim to have done. The model on view clearly illustrates how the switches and crossings are to be made. I claim that the third rail in this case makes the best job with the 80-lb. rail. I realize that the tendency in Australia is to increase the weight of rails, and no doubt in the course of time rails much heavier than 100 lb. will be adopted, but if a third rail is to be laid I contend that an 80-lb. rail, with a 2¼-in. head and a 5-in. flange is the only satisfactory one to use. Of course, the third rail is not intended to be a permanent fixture. It is only a means to an end. By degrees the outer rail will have to be removed and returned to stock, leaving the standard gauge of 4 ft. 8½ in. alone. On no account must you attempt to interfere with the existing track. I do not think it would be wise at the present juncture for the South Australian Government to lay 100-lb. rails between Adelaide and Salisbury. Unification must eventually come about, and then would be the time to adopt the heavy section. For the time being, however, the line from Adelaide to Port Augusta should, in my opinion, be constructed with 80-lb. rails. This would undoubtedly be safer for a third rail proposition. My invention is suitable for crossover roads, scissors roads, single and double slips, turntables, a broad gauge leaving mixed gauges, and a narrow gauge leaving mixed gauges. Every device now employed in ordinary railway practice can be adopted by my method, and it can be done without increasing ordinary railway risks. It is nonsensical to say that it is impossible to use a third rail successfully over a long stretch of line, such as a distance of over 100 miles or in station or goods yards. I put down the first third rail ever laid in Australia. I designed and laid out the Wolseley station yard. I made the points and crossings, and did all the signalling and interlocking. That line is working to-day, so far as I know, just as I left it 40 years ago. I was engineer in charge of the experiment at Tocumwal carried out on behalf of the New South Wales Government. We put trains over the road up to speeds of 55 miles an hour, and the trial was a complete success. In that case the standard and 5-ft. 3-in. gauges were combined. I showed how to make one turntable answer for both gauges. To show the accurate balance for engines of either gauge my device provided, an old man 75 years of age operated the turntable unaided. No derailment or other accident occurred. The switches put down were known as Brennan's. It was argued by one or two of the engineers that if a driver came against a signal with the Brennan switches in a certain position his engine would be derailed. No doubt it would; but I have eliminated the fault in the Brennan switches, and since then I have invented an entirely new and different design, as shown by my model I have not the remotest idea why the engineers reported against the third rail device at that time. I was perfectly satisfied with the experiment, and so were other engineers outside the Railway Department. I was astounded at the decision to which the State engineers came I am glad the committee has inspected the third rail at Wodonga. It cannot be pretended that that is a fair illustration of the third rail system. The arrangement in that yard is unsafe. You can make the mistake of turning a narrow-gauge train on to a broad-gauge track. It is a rough job, and can no more be compared with my third rail system than you can liken a costermonger's donkey cart to a Rolls-Royce motor car. It is an insult to the committee to call that a third rail. When I first inspected it I had retired from the service. I claim that it is not a proper third rail system, because such a system should be applicable to any modern condition in railway yards. I inspected the Wodonga yard in 1915. Mr. Norman, then Chief Commissioner in Victoria, held it up to Mr. Deane and myself as a specimen of what could be done by Victoria with the third rail device. I condemned it then, and showed Mr. Norman where it was wrong. Brennan's patent consisted of five switches, of which the intermediate ones took the place of crossings, which at that time were considered impossible. In my own patent I have eliminated those switches completely. The Brennan switches used at Tocumwal were condemned by engineers and by me, who was the engineer in charge of the job. In my device I simply use three ordinary switches for the two gauges, and in lieu of the common crossings I provided fixed points made of manganese steel, so that there would be no risk whatever of derailment through engines or trucks going over this part of the road. It is a perfectly safe device, regardless of any speed that would be allowed by the department. The single or common rail should always be placed next to the platform, and on a single line the trouble is got over by means of a change of the common rail. This enables the train automatically to go from one rail to the other without any movable points. I produce my model showing the change of common rail to enable either rail to be alongside the platform. There is a crossover with fixed points, and both the 4-ft. 8½-in. rolling-stock and the 5-ft. 3-in trucks pass over the fixed points. My switches with a fixed point system make a junction as simple and safe as an ordinary junction is to-day. My system has not been brought properly under the notice of the Commonwealth or State Railway Departments. The ex-Minister for Works and Railways (Mr. Stewart), the Treasurer (Dr. Earle Page), and the Commissioner for Railways in Queensland have inspected it. If the committee wished to have an official trial made, I should be prepared to render all possible assistance in giving a practical demonstration of it. It seems to me that a great opportunity is presented to have a test made at the Red Hill yard. A short section of line could be laid in the direction of Adelaide, and another short section towards Port Augusta. This would enable a practical test under ordinary working conditions to be made, and if the system were adopted the work put down would not represent money wasted. I could supervise the installation. I am solely interested in the patent rights. No company is associated with me in the matter. As to financial considerations, I refer the committee to my business manager. I strongly advise that only 80-lb. rails should be used for the experiment. If heavier rails were employed I would not have the same confidence in my system. I am satisfied that if heavier rails were employed no other system would be satisfactory. No room would be left for the fastenings. Under my system standard bolts and fish-plates can be used. Derailments on a main line are so few that the danger of the cutting off of the nuts need not be taken into consideration.

249. *To Mr. Lacey.*—If I had a plan of the Red Hill yard I should be able to say how much work would be necessary to carry out a trial of mixed gauges there. A scissors road, although quite practicable, is so expensive that it would be preferable to have two separate crossovers. It would be well to have rolling-stock of mixed gauges transferred to Red Hill. It would be necessary to bring an engine of standard gauge from Port Augusta, and it would be well to have an ordinary four-wheel wagon and also a bogie van. On the third

rail system in England, to which I have referred, the trains ran through station yards. In 1914 I made the plan produced, which shows how an 80-lb. line can be laid alongside a line having 100-lb. rails, but I do not advise the adoption of this method. The use of 80-lb. rails makes a better, a more even, and a less costly road. I contend that a good 80-lb. line, with the proper number of sleepers, is better than a 100-lb. line with fewer sleepers. The danger would lie in the points and crossings rather than on the straight track. Railway Commissioners in Australia have not asked me to meet them in conference or to negotiate with them about my third rail device. Generally speaking, their policy has been to oppose any means of altering the gauges or bringing about unification, and I have abandoned the idea of obtaining a fair hearing from them. I am prepared to give any demonstration, and with my 40 years' experience I ought to know something about the matter. The third rail was abandoned in other parts of the world 40 years ago, and it is easy to understand why the State Commissioners are opposed to it. My reason for preferring 80-lb. rails to 100-lb. rails is because of the difficulty in inserting the fastenings.

250. *To Mr. Cook.*—Derailments may occur from so many causes that it would be impossible to state the reasons for them. Some time ago a goods train was going round a large-radius curve when suddenly one of the bogie wheels jumped a rail. How it came to leave the line has never been discovered. With a properly constructed third rail road there would be no more risk with the switches and crossings than with those on any existing railway, and I should be prepared to ride over it at any speed There is very little danger from obstacles falling between the two rails It takes a lot to derail an engine I have known cast-iron chairs, placed on the two rails by some miscreant to be smashed by an engine without derailing it In the event of my giving a practical demonstration of my system, I take it that the Federal Government would bear the cost This should not be great, and I am certain that the trial would be so satisfactory that the device would be adopted.

251. *To Senator Reid* It would be possible to work my third rail system between Albury and Melbourne Barnawartha is 13 miles from Albury, and my proposal is to lay a third rail between the two stations, and form another mixed gauge yard at Barnawartha as an auxiliary to Albury and Wodonga. The Albury yard is already as big as it can be, and with an additional yard the congestion of traffic would be relieved I would propose running the third rail around the Wangaratta station, instead of through it, since it is a very complicated yard. I would similarly deviate round any big station, but the third rail could be taken through small stations. I contend, therefore, that on a much simpler line, such as between Red Hill and Adelaide, a third rail could easily be installed. I would not contemplate for a moment running a third rail through a large complicated yard. It would be simpler and cheaper to run round it. I know the Adelaide yard fairly well. I was the first engineer to interlock it That was 40 years ago. There should be no difficulty in taking both the standard and 5-ft. 3-in. gauges into the Adelaide station. Where there's a will, there's a way. If the gentlemen now opposing me would approach me in a friendly spirit, I should be glad to cooperate with them, and between us the problem could, I am sure, be solved to the satisfaction of everybody My scheme is a temporary expedient pending unification. At the Tocumwal trial Sir Gerald Strickland who was himself an experienced railway engineer, stated that I had no doubt solved the third rail problem. The unification of gauges, as proposed by the Federal royal commission, would cost in the neighbourhood of £100,000,000, but in the meantime there would would be a loss of traffic that I estimate at £3,000,000 between Sydney and Melbourne alone. For the last thirteen years I have devoted the whole of my time to the matter of the conversion of the gauges at a reasonable cost, with absolute safety, and without interfering with the existing traffic. I claim that I have succeeded, and all that I ask is that a practical test be made

The witness withdrew.

Robert Limond Rauken, Engineer-in-Chief, New South Wales Railways, sworn and examined.

252. *To the Chairman.*—I have no practical knowledge of mixed gauges outside Australia, but I have read of them in connexion with the Great Western line, in England, and other lines in America I was not concerned in the experiment at Tocumwal What I remember of the arrangement is that there were two switches facing one another, and one appeared to be rather unsafe for trains travelling at high speed. If an engineman ran against his signals there would certainly be a derailment. I agree in the decision to which the engineers came. I am not aware of any trouble having been experienced as a result of the third rail in operation at Wodonga. With two 100-lb rails together there would be a space of only ¾ inch for the spikes, and on curves, where adjustments have to be made on account of the wear, there would be insufficient room for them. Rails are apparently rolled exactly, but there is often a difference of 1-16th inch. You have to adjust and pull your rails to get a perfect road. That is why I object to the space between the two rails being limited to such an extent as it is when two 100-lb rails are used Although not as strong as ¾-in. spikes, ⅝-in. spikes would probably hold the rails. We have had experience of creep, principally on steep grades, but also on level tracks, and even on inclines. On the Hawkesbury bridge the rails were rolled out and caused to creep to such an extent that they had to be pulled back 10½ inches once a week. That was on the up road, with a grade of 1 in 100. On the down road the creep was less. It was caused simply by the rolling action across the bridge. That could not be counteracted by any system of spiking. The rail anchor has proved to be the only sure remedy. At Wodonga, so far as I am aware, there has been no objection on the part of the Victorian authorities to the third rail. I do not know of any accident having occurred there. During my trial a derailment would have taken place if the train had gone on. Possibly the train was then going against the fixed points. I strongly oppose the adoption of a third rail between Albury and Melbourne, because it would have to cross eight branch lines A few trucks would be required on one branch, and a few on another, and with the third rail an engine and train crew would be required to take a few trucks on a branch line. Such a system would be economically unsound. The same objections would probably apply to the adoption of the third rail between Adelaide and Red Hill. If that line has many branches, I certainly condemn the proposal. In view of the fact that the policy of the Commonwealth is to unify the gauges of Australia, it would be infinitely preferable to pull the rail in between Red Hill and Salisbury or Adelaide The standard gauge without a third rail should be continued into Adelaide, for preference There would thus be a saving of from £80,000 to £100,000, and another step would be taken in the direction of the unification of gauges From my recollection of Mr Garvan's report, one of the first recommendations was the widening of the standard gauge of the line from Fremantle to Kalgoorlie Now we have an opportunity, whether South Australia objects or otherwise, to continue the standard gauge as far as Adelaide. Station yards should not be complicated by running a third rail through them. A deviation round stations is eminently desirable, or a fresh station should be erected. This would be cheaper and more satisfactory. I have no doubt that the South Australian authorities would object to the adoption of the standard gauge without the third rail, but we should all pull together for the benefit of the Commonwealth. Probably financial arrangements could be made that would be satisfactory both to the Commonwealth and the State. I do not

think that there is much to fear from articles that may fall from rolling-stock and lodge between the two rails. If an object that the wheels of an engine could not crush chanced to fall from a truck, and lodge on a rail, it would probably cause trouble, but we have never had an accident of that nature through the use of check rails on curves. The distance between the check rail and the ordinary rail varies from 2¼ to 2½ inches, according to the nature of the curve. In fastening fish-plates the two bolts on either side of the joint are placed with the round head inside, and the other two bolts are in the reverse direction. In case of derailment and the shearing of the bolts, you still have two bolts holding the rails together. With the third rail it would be necessary to have all the heads on the inside, and in case of derailment the rail ends would be free.

253. *To Mr. Cook.*—High speed round curves is one of the principal causes of derailment. There are so many contributing factors that it is difficult to name the principal cause, and it is often hard to say what has caused a derailment. It is chiefly due to improper maintenance of the track. Sometimes obstructions are placed on the rails. Derailments through live stock being on the track are exceptional. Trouble due to foreign substances falling on the track very infrequently occurs. There would be no more danger of derailment with a third rail than with a plain road. In a big station yard it would be dangerous to run at any speed, and at any station that had complicated points and crossings, even shunting would be dangerous with a third rail. With three rails there should be no great difficulty in keeping the line in repair, particularly if the third rail was inside the wide gauge. There would be a little more maintenance required, owing to the third rail, and the difficulties in regard to the dog spikes would have to be overcome. If the spikes worked loose at joints, you could not knock them down without taking out the fish plates. Speaking of 100-lb. rails, with a gap of ¾ inch between the two, there would be no room to adjust the rails on a curve; but on a plain track, either straight or curved, there should be no trouble at all. I do not think the cost of maintenance would be seriously increased by the use of a third rail if ironbark sleepers, such as are used here, were employed. Such a line could be laid with a minimum of risk, but I do not favour it. There is nothing practically impossible about laying it, apart from station arrangements In station yards, however, and where there are likely to be many branch lines, a third rail should not be used Derailments could be caused through objects, such as couplings, dropping between the two rails. These could cause a derailment even on a single line. Thousand of things that might happen apparently do not occur to any appreciable extent So far as my recollection goes, no accident has been occasioned through an object dropping between the check rail and the main rail Provided a third rail were put down with all possible care, it would not add to risk, except at station yards.

254 *To Senator Barnes.*—If a third rail were laid between Adelaide and Red Hill, it would not necessarily mean that the traffic would be dislocated until the completion of the job We do not propose to dislocate the traffic between Albury and Melbourne when the standard gauge is introduced. The third rail would be laid down, and everything made ready for the change-over. On the Adelaide to Red Hill line, for instance, special points and crossings for the narrow gauge would be prepared, and the track would be got ready and pulled over, say, as far as Snowtown possibly on a Sunday.

255. *To Senator Reid.*—Personally, I should pull this line in to the 4-ft. 8½-in. gauge in as economical a way as possible. Considering the matter from a practical point of view, I should say that it would be a good financial proposal to establish the standard gauge as far as Adelaide. I do not oppose the South Australian proposal as a temporary expedient to overcome the present difficulty, but if the third rail is to be laid to assist in bringing about the unification of the gauges, I strongly suggest pulling in the track immediately, because money will thereby be saved. Provided provision were made for a deviation around complicated yards, there should be no difficulty about the third rail proving practicable. I see no serious danger to the travelling public. You inform me that the third rail would be introduced as far as Port Pirie. That complicates the matter immediately, and strengthens my view that the right thing to do is to convert the line to the standard gauge. From the point of view of economy, I should have nothing to do with the third rail. The gauge should be standardized between Adelaide and Melbourne also: increasing the length of 5-ft. 3-in gauge lines only means adding to the difficulties.

256. *To Mr. McGrath.*—Laying a third rail between Red Hill and Adelaide, and connecting Port Pirie, would cost an extra £130,000 or £140,000 in material alone as compared with a plain road. On a down grade, where brakes are applied, the rails on the outside of the curve would creep more than the inside rails. The creep is seldom the same on both rails. This does not add to the danger, but it adds to the work of the fettlers. Instead of employing four men on each stretch of 8 miles, you might have to decrease that distance. We are now checking creep, and within the next twelve months I hope to have all creep stopped. A third rail would not be any more dangerous than a check rail. There is little likelihood of an accident occurring through obstacles falling from trucks and lodging between the two rails. A third rail line would be no more dangerous in that respect than a single track.

257. *To Mr. Lacey.*—The Tocumwal experiment was made to demonstrate the safety or otherwise of the Brennan switch and the third rail system. I do not consider it suitable for fast traffic through station yards. I should not like to run at 30 miles an hour where the Brennan switch was adopted. I do not advocate having any break-of-gauge stations on the line from Red Hill to Adelaide. I should like to see the whole of the system in South Australia converted to the standard gauge.

258. *To the Chairman.*—I have not had time to look up the papers relating to Mr. Wilkin's scheme in connexion with the Tocumwal experiment, and I have not had an opportunity to examine his models. I have fought shy of the third rail because of the difficult problem of dealing with the traffic between Albury and Melbourne. It seems to me to be impracticable and extravagant to work from a traffic point of view. We have a mile of reinforced concrete sleepers on the goods line that runs around Rozelle Bay to Darling Harbour. They are expensive, but quite satisfactory. I think they cost about 18s. Even if they last 40 years, I do not know that economy will result from their use. We are now getting good ironbark and redgum sleepers, which last from 25 to 30 years, and we are increasing our axle load to 50,000 pounds. Hewn square wooden sleepers cost 5s. 6d. first class and round backs 4s. 10d. We get prices from cutters for delivery at certain stations.

(Taken at Melbourne.)

WEDNESDAY, 24th MARCH, 1926.

Present:

Mr. MACKAY, Chairman;

Senator Barnes	Mr. Lacey
Senator Reid	Mr. McGrath
Mr. Cook	Mr. Seabrook.
Mr. Gregory	

Norris Garrett Bell, Commonwealth Railways Commissioner, recalled and further examined.

259 *To the Chairman.*—The utilization of the third rail was originally suggested at a conference between

the Commonwealth Government and the Government of South Australia that was held in Melbourne in connexion with the construction of this railway and the North-South line. Mr. Webb, the South Australian Railways Commissioner, and I were present at that conference. I think it is desirable to use the third rail on this section. I prefer to have only one gauge between Kalgoorlie and Adelaide. To convert the present 5-ft. 3-in. gauge to one of 4-ft. 8½in., between Red Hill and Salisbury, would considerably affect South Australia, because it has recently altered the line from 3 ft. 6 in. to 5 ft. 3 in. I understand that the South Australian Government expects to complete the whole of its conversion work shortly. I do not think that the adoption of a third rail would delay the unification of the railway gauges of Australia. I think it is a mistake for South Australia to convert its 3 ft. 6 in. lines to 5 ft. 3 in. It would have been very much better to have brought them to the 4-ft. 8½-in. gauge. It would be an excellent thing if we could unify the gauges between Kalgoorlie and Adelaide, but under present conditions South Australia would not agree to such a proposal. It was at first suggested that the line from Red Hill to Salisbury should have a gauge of 4 ft. 8½in. At one time the proposal was made that the Commonwealth should purchase that line, but South Australia pointed out the disadvantages it would suffer if the gauge between Red Hill and Salisbury were made 4 ft. 8½in., and eventually it was agreed to adopt the third rail principle. I am satisfied that the third rail can be safely and successfully used. The only difficulty that could arise is in connexion with points and crossings, but that could be satisfactorily overcome. I have not yet seen the plans which have been prepared by South Australia of suitable points, crossings and interlocking devices. I supplied Mr. Webb with various designs that I had, and he is preparing other designs that I shall require to see. I should have to be satisfied of the perfect safety of the device. Under clause 6 c of the agreement between South Australia and the Commonwealth I have to agree with Mr. Webb regarding the necessity for running round stations. If we decide that it will be impracticable or dangerous to place a third rail on any portion of a line, we can agree to run round a station. I do not agree with Mr. Ballard, Chief Engineer of the Victorian railways, that "the principal disadvantages is that the system is not conducive to safe railway working, particularly on main trunk lines, for passenger traffic operating at a comparatively high speed." I do not know of any definite arguments that he could advance to support that statement. In my opinion, Mr. Ballard was not correct when he said "the use of the third rail system was deliberately excluded from the conversion schemes, either as a temporary expedient during change of gauge operations on the main running lines or as a makeshift in the temporary transfer sidings at depôts." Mr. Simms could state what was included and excluded. I am satisfied that it will be used to a very considerable extent during the change-over period. I cannot understand why Mr. Ballard should say "the danger of derailment on account of articles lodging in the space between the rails on a third rail track is considerable, and must be anticipated. On a third rail system the danger of derailment is undoubtedly greater than on a normal track." There are miles of guard rails on ranges and curves all over Australia. In Queensland several hundred miles of guard rails were put down on sharp curves. I have known vehicles to be derailed by portions of the brake gear having fallen on the track. That was before proper brake guards were devised. It is a very rare occurrence. The difference between the South Australian estimate of £450,000 and ours of £380,000 is caused by a number of small items. The Commonwealth will not actually inspect the work to see that it is done properly, but it will go through the accounts and exercise a general supervision. We will buy and supply certain material as stated in clause 6 (*d*) of the agreement There are certain stations that it will be necessary to run round but on the other hand there are quite a number of small stations that we will be able to run through We will have to be consulted before a decision is arrived at as to whether the line will run through or round any station Although the laying of 100 lb rails on the converted line between Adelaide and Salisbury, and the use of a third rail of that weight will slightly reduce the space between the rails, there will still be sufficient room to put in dogspikes I endorse the suggestion that an alternative route between Port Pirie and Port Germain should be surveyed to try to meet the wishes of the people at Port Germein. The line will be primarily a through trunk line, and every effort will be made to lessen the distance, because any additional distance must add to the rates and fares for all time Mr Hobler considers that he can get as good and as short a line by adopting the suggestions of the people of Port Germein That matter will be inquired into The present distance between Adelaide and Port Augusta is 260 miles The through distance is 190 miles We shall save 40 minutes that is now occupied at Terowie, and a further saving will be possible because of the shorter distance of 70 miles, and the fact that we shall have a level track instead of having to climb two ranges I think the saving in time will be greater than five hours between Adelaide and Port Augusta There is a double line from Salisbury to Adelaide a distance of about twelve miles The third rail will be placed on both roads A general layout relating to the entry of trains to Adelaide station has been submitted to me for my approval We shall build what rolling stock we can in our own workshops, but that will be only a small portion of what we shall require I have seen Mr Brennan's patent for overcoming the difficulties of the third rail at points and crossings Mr Wilkin at one time represented Mr. Brennan, but I understand that he has prepared an amended design I have not yet seen that I did not know that he had new designs until I read his evidence in the newspapers. I do not think it will be necessary to lay down a short length of track to test his scheme We should be able to judge its suitability or unsuitability from his drawings. I intend to examine his plans before coming to a decision. Concrete sleepers are not largely used in any country They were used to a considerable extent in Italy many years ago, but they have been largely taken up and removed from the road India has been using them recently to a considerable extent. The whole of the railway world has been experimenting with them for years, but no satisfactory sleepers have yet been designed. The price at which the New South Wales Railway department can obtain hardwood sleepers— 5s. 6d each is accounted for by the fact that they can be delivered alongside the line. If they had to be railed to Port Augusta, that price would be doubled. We shall call tenders throughout Australia for sleepers for this line. Cattle carried by the line will be discharged at the abattoirs, five or six miles out of Adelaide. The arrangements that have been made for discharging goods and passengers are satisfactory to me.

260. *To Senator Reid.*—South Australia decided a couple of years ago to convert all its lines to the 5-ft. 3-in. gauge. That decision was come to after the commission on the unification of railway gauges had presented its report. The Commonwealth and South Australia do not favour the third rail solely to overcome present difficulties and regardless of any supposed danger. It is a convenient way to overcome the difficulties, and this is a suitable place to adopt the third rail with perfect safety to the public. I believe that no difficulty will be experienced by trains in going over points and crossings safely All trains are supposed to reduce their speed to 20 or 30 miles an hour whilst they are passing through stations. Different speeds are laid down for different stations. Trains which

lieve that that would induce a greater number of passengers to travel. We have considered a suggestion that the 4-ft. 8½-in. gauge should be continued from Port Augusta to Red Hill, and that we should then take advantage of the 5-ft. 3-in. line to Adelaide. That would only go a small way towards overcoming the present difficulty. It would entail the transfer at Red Hill of all through loading from Port Augusta and west of Port Augusta. Passengers also would have to transfer at Red Hill, and live stock would have to be taken off the transcontinental train. There would be one transfer of live stock from the transcontinental line and two from the Oodnadatta line. We want to secure the carriage of a lot of the traffic for the Oodnadatta line. Our route is shorter than the Terowie route. It would not be in the interests of the Commonwealth to stop at Red Hill unless we could be sure of the unification within a short period of the gauges throughout Australia. I am quite satisfied that there is no element of danger in the third rail, with proper inspection and maintenance. Effective maintenance can be exercised even over a long length of line. I understand that the line between Adelaide and Salisbury is to be re-laid with 100 lb. rails, necessitating our laying rails of a similar weight on that section. That will not cause any difficulty in regard to the use of dog-spikes and fishplates; there will be just sufficient room for our standard dogspikes between the two rails. The Victorian Railways Department may use a larger dog-spike than the standard size. When we call for tenders we sometimes specify a time in which the rolling stock must be delivered. At other times we ask the contractor to state the period in which he can supply, and we consider the period in addition to the price. If delivery is not given within the period stated, a penalty is imposed. One such penalty has already been definitely imposed, and another is pending. All our supplies go to Port Augusta by boat. There is a weekly service, which brings all the Oodnadatta and other loading. We have our own wharves at Port Augusta. My department has an engineer who looks after both locomotive repairs and maintenance. His name is Mr. Gahan. He has had a wide experience in locomotive engineering, but has been engaged in permanent way work for only a couple of years. He has a very well qualified assistant for that portion of the work. Mr. Hobler has been all his life in construction work, and for many years in maintenance work. I regard myself as a maintenance engineer

267. *To Mr. Lucey.*—I have not discussed with the South Australian Commissioner the question of continuing the journey to Red Hill instead of changing at Adelaide. For years I have endeavoured to induce South Australia to run through 5-ft. 3 in. carriages on to Terowie, but it has always refused to do so on the ground that the rolling stock is not available, and it would be necessary to build quite a number of new sleeping coaches. I do not think, therefore, that it would agree to run its coaches on to Port Pirie and have the transference made there instead of at Adelaide. It would entail at least one additional train of coaches being built, at a cost of between £60,000 and £70,000. Whilst the train is waiting in Adelaide for the return journey it is cleaned, its water tanks are filled, and in other ways it is put in readiness. Even if this suggestion were adopted it could apply only to passengers and mails The principal difficulty is caused by goods and live stock If stock from the Oodnadatta line were railed to Stirling and then sent down this line, a saving of 28 miles would be effected compared with railage down the Terowie line, but that stock, and also the stock from the east-west line would have to be transferred at Port Pirie Probably the east-west stock traffic is not as great as that which comes by the great northern line, but I believe that in time a great deal more stock will be sent over the east-west line We bring quite a lot of stock to Adelaide from stations on the east-west line and from country south west of Port Augusta The cost of transferring that stock would not be very great. The principal objection would be that the stock would get knocked about, and the time taken in the journey would be extended Although we shall have to pay a considerable sum for the third rail, we shall get the additional mileage on all our goods and passengers that we would not otherwise get If we can put loading into a truck at Adelaide and send it right through to Kalgoorlie it will be less difficult and costly than if we have to transfer at Port Pirie We can then quote one rate for the whole journey Under the other scheme we should have to join in with South Australia It might be convenient to take some of the bridge material to Port Pirie for the bridge across the creek at Red Hill, but rails and sleepers must be sent from Port Augusta, because we have the rolling stock there. If we commenced building from the Port Pirie end concurrently with the Port Augusta end, we should need to take our 4 ft. 8½in engines and trucks to Port Pirie, and keep them in repair there until the connexion had been made It is two years since South Australia commenced the conversion of her lines to the 5-ft. 3-in. gauge. The intention is to convert what is known as the western system, and the Port Pirie-Peterborough line, to that gauge.

268. *To Mr. Gregory.*—If we constructed our line from Port Augusta to Quorn, we should have to climb the Flinders range. It has been estimated that it would cost £400,000 to alter the line between Port Augusta and Quorn to make it conform to the 4-ft 8½-in. gauge.

269. *To the Chairman.*—The conference to which I referred at the beginning of my evidence was first suggested by the Commonwealth. My department is anxious to have a through line from Port Augusta to Adelaide. The third rail is not the only suggestion that has been made for overcoming the present difficulty. It has been suggested that the Commonwealth should buy the line from Red Hill to Salisbury, and alter it to the 4-ft. 8½-in. gauge The Commonwealth does not pay compensation for State lands that are resumed, but it does for private lands. In the section between Port Pirie and Red Hill the Commonwealth will bear the whole of the cost of the resumption, but South Australia will have to pay its share of the interest on the total expenditure, including land and cost of construction. The extra length of sleeper will be a charge against the third rail. South Australia will have to pay the whole of that cost. The Commonwealth standard dogspike has a diameter of ⅞ in If New South Wales has decided to use a larger spike with 100-lb. rails, it has departed from the standard.

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Stanhaven.
Governor-General

Message No. 7.

Bills intituled:

"Western Australia Grant Act 1926"

"Power Alcohol Bounty Act 1926"

as finally passed by the Senate and the House of Representatives of the Commonwealth, having been presented to the Governor-General for the Royal Assent, His Excellency has, in the name and on behalf of His Majesty, assented to the said Acts.

Sydney,

22nd March, 1926.