

# PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

## REPORT

TOGETHER WITH

## MINUTES OF EVIDENCE

AND AN

## APPENDIX

IN REGARD TO THE

PROPOSED EXTENSION OF THE PINE CREEK-KATHERINE
RIVER RAILWAY SOUTHWARDS SO FAR AS BITTER
(MATARANKA) SPRINGS.

## MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

## (First Committee.)

## EDWARD RILEY, Esquine, M.P., Chairman.

Scnate.
Senator the Honry Reating, Senator Patrick Joseph Lynch (Vice-Chairman),
Senator William Harrison Story.

House of Representatives.

James Edward Fonton, Esquire, M.P.,
William Flyfe Fithlykon, Esquire, M.P.,
The Honorable Henry Gregory, M.P.,
Svidnoy Sampson, Esquire, M.P.,
William Henry Laird Smith, Esquire, M.P.

					INDEX					
										Page,
Report	••	••	••	••	••		••		••	3
linutes of E	vidence		••	••	••					/3
ppendix				••		••	••	••		67

#### LIST OF WITNESSES.

ndrews, William Wallace, Assistant Engineer for Railway Cons	truction,	Bouth Au	tralia	38
ell, Norris Garrett, Engineer in Chief and Acting Commissioner	, Commo	nwealth I	Railways	13.4
rown, Henry Yorke Lyell, late Government Geologist, South Au	stralia		•••	1114
frown, John Alexander Voules, ex-Member of the House of As Northern Territory	sembly,	Bouth Au	stralia, fo	or the 16
ahill, Patrick, Protector of Aborigines and Superintendent at O	onpelli, l	orthern T	Corritory	58
ombes, Algernon, Engineer, Melbourne	•	••	•••	30
ay, Theodore Ernest, Chief Surveyor, Northern Territory	••		••	52
vans, Rowland James, Superintendent of Railways, Northern Te	rritory	••	••	18
rancis, Harry Vivian, Assistant Engineer, Commonwealth Railwa	ув	••	••	20
ilruth, John Alexander, Administrator, Northern Territory	••	••	••	63
oodman, William George Toop, Chief Engineer and General Man	ager, Tra	mway Tr	ast, Adela	ido43
lobler, George Alexander, Construction and Maintenance Engine	eer, Com	nonwealth	Railway	n 25
funt, Atlee Arthur, C.M.G., Secretary, Department of External	Affairs	••	••	/5
ewis, the Honorable John, M.L.C., Pastoralist, Adelaide	••	••		36.
indsay, David, Surveyor, Darwin				5€
earce, William Thomas, Miner and Manager for Walter Bell and	Co., No	thern Ter	ritory	60
tutterd, Louis Norman, Mining Engineer and Battery Manager, 1	Marranbo	y, Northe	n Territo	ry 6 (
Vaters, Nicholas, Inspector of Police, Northern Territory	••	••	••	63
lators, Robert Charles, Assistant Surveyor, Commonwealth Rails	Ways	••	••	62
ells, Lawrence Allen, Deputy Commissioner of Federal Taxation	, South A	ustralia	••	141
Villiams, Victor Albert, Surveyor, Commonwealth Railways	••	••	••	571

#### EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES.

#### No. 96 or 5TH NOVEMBER, 1915.

5. PUBLIC WORKS COMMITTEE—REFERENCE OF WORK—KATHERINE RIVER TO BITTER SPRINGS RAILWAY.— The Order of the Day having been read for the resumption of the debate on the following motion of Mr. O'Malley, That, in accordance with the provisions of the Commonecula Public Works Committee Act 1913-1914; the following work be referred to the Parliamentary Standing Committee on Public Works for their Report, vir.:—

Extension of the Pine Creek-Katherine River Railway southwards so far as Bitter Springs.

Debate resume

Mr. Poynton moved an amendment, That the words "and from Codnadatts to Alice Springs in a northerly direction" be added to the motion.

Debate continued.

Amendment ruled out of order.

Debate on original question continued,

Original question-put and passed,

## PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

## PROPOSED EXTENSION OF THE PINE CREEK-KATHERINE RIVER RAILWAY SOUTHWARDS SO FAR AS BITTER SPRINGS.

## REPORT.

THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS, to which the House of Representatives referred for consideration and report the question of the proposed extension of the Pine Creek-Katherine River Railway southwards so far as Bitter Springs, has the honour to Report as follows:—

1. 11 :

#### INTRODUCTORY.

- 1. On the 1st October, 1889, the State of South Australia, as custodian of the Northern Territory, opened for traffic about 145½ miles of railway from Darwin to Pine Creek as the first section of the line which it was intended should link up the Northern Territory with South Australia.
- 2. When the Commonwealth took over the Northern Territory on the lat January, 1911, one of the conditions of the transfer was that the Commonwealth should—
  - "Construct or cause to be constructed a railway line from Port Darwin southwards to a point on the northern boundary of South Australia proper . . . . ?

and a section of 54½ miles to carry the line southwards from Pine Creek to Katherine River is being proceeded with. In November, 1913, the field survey work was completed and the line is now under construction.

#### PRESENT PROPOSAL.

- 3. The present proposal is that the line now under construction between Pine Creek and Katherine River should be continued from the left or southerly bank of the Mally Katherine River for a further distance of 63 miles 65 chains in a south-easterly direction which will earry it to Bitter Springs.
- 4. It is the intention to use 60-lb. rails and fastenings, and to construct the line so that the earthworks, bridges, water-ways, and sleepers will be suitable for the 4 ft. 8½ in. gauge, and will permit of the rails, though laid temporarily to a 3 ft. 6 in. gauge, being widened at any time to the 4 ft, 8½ in. gauge.
- 5. The proposed line is to be a single track with all stations on the rail level; the ruling grade is to be 1 in 100, and the sharpest curve will have a radius of 40 chains.

#### ESTIMATED COST

6. The Departmental estimate of the cost of the work is set down at approximately £320,000, including provision for station accommodation, telegraph line, and water supply; and it is stated that the work can be completed in about 18 months from the date of commencement.

#### ESTIMATED REVENUE

- 7. The revenue which the Department estimate will be derived from the construction of the proposed railway amounts to approximately £12,000 per annum; the estimated cost of traffic, locomotive, working, and general supervision would be approximately £5,500 per annum; while the estimated cost of maintenance is set down at approximately £5,300 per annum.
- 8. The total xevenue expenditure including maintenance would thus amount to about £11,800 per annum, so that not taking into consideration interest on capital cost the revenue would approximately balance the expenditure.

#### ALTERATION OF NAME—"BITTER SPRINGS."

- 9. On the 12th January, 1916, a notification appeared in the Press to the effect that, on the recommendation of the Administrator of the Northern Territory, the Minister for External Affairs had approved of the alteration of the name "Bitter Springs" to "Mataranka Springs." The reason for the change was stated to be that the Springs were not bitter but fresh, and the name therefore was misleading.
- 10. As the locality was called "Bitter Springs" in the reference of the proposed work to the Committee, and referred to as such by witnesses throughout the inquiry, the old name has been retained in this Report to avoid confusion.

## COMMITTEE'S INVESTIGATIONS.

- 11. In the course of its inquiries the Committee ascertained that the Royal Commission on Northern Territory Railways and Ports was favorable to the railway taking a westerly swing from the Katherine to the neighbourhood of Willcroo, subsequently returning to the overland telegraph route in the vicinity of Renner Springs.
- A further suggestion was made that the railway should follow a "central route" about mid-way between the westerly swing and the so-called easterly swing via Bitter Springs.
- 12. The Committee studied the various reports dealing with the Northern Territory which have been issued from time to time, and took evidence in Melbourne and Adelaide from persons acquainted with the Northern Territory generally, and with that particular section of the country proposed to be traversed by the railway under consideration.
- 13. As there were still several important matters upon which the Committee had no satisfactory information, a Sectional Committee, comprising three members of the Committee, was constituted for the purpose of visiting the Northern Territory and reached Darwin on 12th July, 1916.
- 14. Advertisements were inserted in the Darwin Press intimating that the Sectional Committee was desirous of obtaining information in regard to the proposed railway and the country to be traversed, evidence was taken wherever practicable, and in addition the several members of the Sectional Committee by informal inquiry and conversation at all times sought to acquaint themselves with the condition of affairs in the Northern Territory and the nature of the country in the various parts.
- 15. A journey was undertaken over the whole of the railway open to truffic and continued to the head of the line under construction, and an inspection was subsequently made of the country through which would pass each of the suggested routes for the railway from the Katherine River southwards.
- 16. The Sectional Committee returned to Sydney on the 20th August, 1916, and on the 21st idem presented its report to the General Committee.

#### SLERPERS.

- 17. In the course of its inquiry the Committee ascertained that when the first section of the line from Darwin to Pine-Creek was constructed by the South Australian Government steel sleepers were used, and, with the exception of some within a short distance of the coast, are still in good condition. It was the intention of the Commonwealth to continue the use of steel sleepers, and portion of the section from Pine Creek Katherine River was so Inid. Owing, however, to the rapid increase in the price of steel sleepers from 10s. to 10s. each, it was decided by the Department to use wooden sleepers for the remainder of the section, and a similar type of sleeper is proposed for the section now under consideration.
- 18. These sleepers will be 8 ft. 6 in. long x 9 in. x 5 in. --a size sufficient to take a 4 ft. 8½ in. track—and it is intended that they shall be laid in such a manner that the gauge may in future be altered from 3 ft. 6 in. to 4 ft. 8½ in. by moving one line of rails only.

#### RAILS.

- 19. From Darwin to Pine Creek the track is laid with 41-lb. steel rails, but it is intended to use 60-lb. rails on the Katherine River-Bitter Springs section.
- 20. Eventually, when the gauge is altered to 4 ft. 8½ in., it is proposed to have the whole line laid with 60-lb. rails and to utilize the lighter rails for any branch lines which may be built.

#### BRIDGES.

- 21. The estimate set down for the construction of bridges and culverts is £13,362. It is stated, however, that there are but few engineering difficulties on the proposed route and that there will be only one bridge of any consequence, namely, that across the King River. This bridge will consist of three 40-ft, spans, and be constructed on concrete piers with steel girders at an estimated cost of £1,920.
- 22. The balance of the amount estimated is to cover provision for the remaining smaller bridges and concrete box drains.

#### EMPLOYEES.

- 23. It was stated in evidence that there are 392 men working on the line to the Katherine River who will be available for work on the extension to Bitter Springs if the construction of that extension be not delayed too long.
- 24. Of this number the majority are foreigners, consisting principally of Greeks, Italians, Maltese, Patagonians, Russians, and Spaniards.
- 25. Inquiries were made as to the possibility of these men remaining permanently in the Northern Territory, and the Committee was informed that there is little likelihood of any number of the men employed on the railway becoming permanent settlers.

#### ROUTES SUGGESTED.

- 26. Possibly few people realize that this immense Territory, comprising an area of 523,620 square miles, is more than four times the size of the United Kingdom, and greater than the combined areas of the United Kingdom, Belgium, France, Italy, Roumania, and Switzerland. Further, that the total population of this area, exclusive of aborigines, is less than one person per 100 square miles.
- 27. It should, therefore, be understood in dealing with this proposal that an extension of 60 or 70 miles of railway from the Katherine southwards, whether on the central route or the easterly or westerly swing, will, of itself, contribute little towards the early development of the country, and in addition it is very improbable that such a line will become a payable proposition for many years.
- 28. The Committee, therefore, considered the matter chiefly from the point of view of the main North-South line, and endeavoured to satisfy itself as to the best route which such a line should follow for the first 60 or 70 miles after leaving the Katherine.

- 20. Briefly, the class of country along the several routes as observed by the Sectional Committee may be outlined as follows:—
  - (a) Westerly Swing.—Medium to good pasteral country, soils of excellent quality excepting on the quartitic ridges, some stretches of sand and sandy loam merging into basalt country in the vicinity of Willeroo. This district contains a good deal of broken country, and a few miles east of Willeroo can be seen a line of cliffs, often sheer, which stretch in a continuous line along a general north and south direction. The country is dotted with table-topped and conical-shaped hills, probably the outliers of a former extensive tableland.

The westerly route shown on the plan issued by the Royal Commission on Northern Territory Railways and Ports is impracticable, excepting at very heavy cost. By making certain deviations, however, it would be possible to construct a westerly swing for the main line, but this would increase the length of the line owing to the broken nature of the country traversed in certain parts within the first 100 miles. Additional bridging would also be required, so that the construction of this swing would not only be longer but much more costly than on the route of the easterly or overland telegraph line to Mataranka. No permanent surface waters of any extent were found between the Katherine River and Willeroo.

- (b) The Central Route.—Would traverse country generally limestone and quartzite, medium pastoral land, with patches of black soil, hard and uneven during the dry season, but which would seem to be subject to periodical inundations and be soft and boggy during the wet season. Several deep dry creeks have to be crossed and no large supply of permanent surface water exists.
- (c) The Easterly Swing.—Would traverse country generally limestone and quartzite, with stretches of open forest and park-like lands, and good pastoral country near Mataranka. The route is fairly well watered; only one bridge of any magnitude would be required, and the country generally appears to be free from engineering difficulties.

#### PROSPECTIVE REVENUE.

- 30. The Committee made inquiries as to the class of industry likely to be most successful in developing the Territory, and discussed the bearing such industry might have on the prospective receipts from the railway, and is inclined to the opinion that for many years to come the railway must depend on pastoral holdings and mining for its revenue.
- 31. It was stated in evidence that under existing conditions a man would require 300 or 400 square miles of the best pastoral land in the Territory to be assured of a reasonable return for his labours, although naturally—with the erection of fences, the granting of railway facilities, and the provision of water supplies—the minimum size of a payable pastoral holding could be substantially reduced. Agriculture will probably develop later as the country becomes more settled and a market is available for the products, as the Committee had anuple proofs that with a good supply of water the soil in parts of the country visited is good enough to grow almost anything.

#### · Bores.

32. With the extension of a definite plan of the policy now adopted to some extent of sinking bores much might be done with country which is at the present time precluded from serving any useful purpose by reason of its lack of water during the dry season. South of Mataranka three bores already completed have, at depths of 108, 175, and 190 feet respectively, struck ample supplies of water of excellent quality—discoveries which must materially aid the development of that portion of the country.

#### MINING.

33. Apart from several mines on which more or less developmental work is being carried out, there is every indication of the existence of good tin-bearing stone over an area of perhaps 20 square miles at Marranboy. Although some of the mines are even now being worked profitably, the cost of transport under present conditions makes it impossible that the field should be developed as it should be.

34. It was stated in evidence that the price of carting to the railway at Pine fluctuation Creek is £12 10s, per ton, while it costs approximately £20 per ton to place material on board at Darwin. It is possible that the rate to the railway may fall to £5 or £6 per ton upon completion of the railway to Katherine, while if the section to Bitter Springs be constructed and come within 12 miles of Marranboy the rate to the railway should be reduced to £2 or £3 per ton.

#### TIMBER.

35. Inquiries made convinced the Committee that no suitable local timber in any quantity can be economically obtained for sleepers. Plenty of good sand and grayel, however, are available for concrete work.

#### COMMITTEE'S RECOMMENDATIONS.

#### SLEEPERS.

- 36. The Committee is of opinion that no good purpose would be served by laying wooden sleepers 8 ft. 6 in.  $\times$  9 in.  $\times$  5 in. as now proposed with a view to their being utilized when the gauge is widened to 4 ft.  $8\frac{1}{2}$  in.
- 37. As a number of years will probably clapse before the gauge of the railway is altered from 3 ft. 6 in. to 4 ft.  $8_k$  in., and assuming that the life of a wooden sleeper in this district is about 10 years, it is unlikely that any wooden sleepers now laid would be in a suitable condition to be utilized for the broader gauge.
- 38. It is therefore recommended that if wooden sleepers be used the size  $7 \text{ ft. } \times 9 \text{ in. } \times 4\frac{1}{2} \text{ in.}$ , which is suitable for the 3 ft. 6 in. gauge, be adopted at a saving of approximately £180 per mile.
- 39. It was stated in evidence that some 50,000 8 ft. 6 in. x 9 in. x 5 in. powellized karri sleepers have been supplied for the construction of the Pine Creek to Katherine River line. As it was ascertained that white ants abound along the route under construction, and it is known that untreated karri is speedily affected by dry rot when used as sleepers, and as the evidence submitted showed that no effective time test had yet been made as to the life of wooden sleepers in the Territory, the Committee considers that, if timber sleepers are used, only the best and most durable hardwood timbers should be utilized.
- 40. The Committee was, however, greatly impressed with the samples of concrete sleepers which it inspected in the transvay track in Adelaide, the railway track in the vicinity of North Adelaide, and in the railway track in the vicinity of Leichhardt, New South Wales, where they are undergoing tests under working conditions.
- 41. As it was stated in evidence by the Engineer-in-Chief, Commonwealth Railways, that about six months would elapse from the time this section is authorized until the time when any sleepers re laid, it is recommended that a supply of concrete sleepers be made at once, using sand and gravel obtainable locally, and that experiments be made with these sleepers on the section now under construction, particularly on steep banks and sharp curves, with a view to the adoption of this class of sleeper if suitable on the Katherine River-Bitter Springs section. In conducting these experiments it is suggested that the manufacture be carried out on such a scale as will not only give a good idea of the utility of the sleepers but of the cost of such sleepers with a view to their use on subsequent sections of the main line.

#### DEFENCE ASPECT.

42. In the event of Australia ever being called upon to resist an enemy attack on her northern coast, it is generally admitted that a railway connecting Darwin with the south, even if it be only a single narrow-gauge track, would be of considerable

advantage from a defence point of view. The greatest safeguard against aggression in that quarter, however, would be the existence of a considerable permanent white population, and for that reason the Committee is of opinion that it is of vital importance that settlement of the country should be, as far as practicable, contemporaneous with the construction of the railway,

#### EMPLOYEES.

43. The Committee is aware that a number of the foreigners employed on the line at present under construction, by working under what is known as the butty gang system, are carrying out the work more satisfactorily and carning more money than those employed on day work, and, as the result means better and quicker work and a better class of employee, suggests that it would be an advantage to the Commonwealth and to the men themselves if this system were extended wherever practicable, and the Australian and British workmen encouraged to adopt it.

Further, in order that the construction of the railway might be made to proceed Further, in order that the construction of the ranway might be made to proceed hand in hand with the settlement of the country, it is suggested that an endeavour should be made to arrange with the majority of the men brought to the Northern Territory for work on the railway to bring their wives and families with them, and that they should be encouraged to take up holdings so that their families could remain on the holdings are the stations that their families could remain on such holdings while they are working on the railway—thus forming the beginning of a

At the present time the vast majority of the men employed are single, and even if they are saving money it is obvious that the money saved is of no use to the Territory. Some men work for six or eight months or a year and then go away and take their savings with them, while it is well known that others are sending large sums of money to foreign countries every month.

As every Australian State is encouraging immigration, it is improbable that the Territory can be settled by an overflow from the south, and in any case it is doubtful the Territory can be settled by an overflow from the south, and in any case it is doubtful policy to encourage the transfer of people from one part of an empty country to another part of an empty country. It is therefore suggested that people from European countries be encouraged to come to the Territory by guaranteeing them work if suitable, by paying their passages in part and making it a debt against them until they are settled in the country, but at the same time holding out hopes that if they settle permanently the debt may be foregone. In the best interests of the Territory, however, and of the men themselves it is adviseble that all assisted immigrate he maying and accompanied men themselves, it is advisable that all assisted immigrants be married and accompanied by their wives and families, or be closely related to those already in the Territory.

## CONCLUSION.

- 44. A study of the evidence given, supplemented by the Sectional Committee's investigations and inspections, led to the conclusion that the central route offered no advantage over either an easterly or westerly swing, and it was consequently
- 45. The line on the westerly swing offers some immediate temporary advantage by reason of the fact that it taps portion of the Victoria River land, which is excellent pastoral country, and at the present time carries the bulk of the stock of the Territory. There are no serious difficulties, however, in droving cattle from the Victoria River country to the railway, and these difficulties will be lessened by the action of the Government in providing a new stock route with sub-artesian and surface-water supplies at regular intervals.
- 46. On the other hand, the easterly swing commended itself to the Committee for the reasons that it would traverse comparatively well-watered country with fewer engineering difficulties than either of the other suggested routes; it would approach the mining field at Marranboy, and some good pastoral and agricultural land in the vicinity of Mataranka; and would open up possibilities of developing the country to the south, which would not be practicable in the absence of a railway.
- 47. The Committee is therefore of opinion that, as a section of the main line, any extension of the Pine Creek-Katherine River railway southwards should proceed via Bitter Springs.

## RESOLUTION PASSED.

48. The decision arrived at by the Committee is shown in the following extract from its Minutes of Proceedings :-

Mr. Finlayson moved-That the proposed extension be approved.

Seconded by Senator Story.

Mr. Sampson moved as an amendment—That all the words after "that" be struck out with a view to the insertion of the words. "The Committee approves of the construction of the lane to Butter Springs. as a part of the main line, but consider that as this section does not promote give any largely intraced traffic in the near future or to serve as a feeder to the Darwin Katherine line, it constructs on keel

Seconded by Mr. Gregory,

The Committee divided on the amendment.

Ayes (3).	Noca (3).
Mr. Fenton, Mr. Gregory, Mr. Sampson,	Senat or Story, Senator Lynch Mr. Finlayson,
	Mr. Riley, Mr. Laint Smit

And so it passed in the negative.

The Committee then divided on the motion

minore then divided on the Butled -		
Ayes (5),		Noez (3
Senator Story.	1	Mr. Fenton
Senator Lynch,	1	Mr. Gregor
Mr. Finlayton	١.	Mr. Samp
Mr. Riley,	1.	our comp
Mr. Laint Smith	,	

And so it was resolved in the affirmative.

EOWAPD RILEY.

Office of the Parliamentary Standing Committee on Public Worlds, 120 King-street, Melbourne, 30th August, 1916.

## MINUTES OF EVIDENCE

(Taken at Melbourne.)

WEDNESDAY, 10th NOVEMBER, 1915.

Mr. Riley, Chairman; Senator Koating, Mr. Finlayson, Senator Story, Mr. Laird Smith. Mr. Fenton,

Norris Garrett Bell, Engineer-in-Chief and Acting Commissioner Commonwealth Railways, sworn and examined.

1. To the Chairman .- I produce a tracing showing the general direction of the proposed extension of the railway from Katherine River to Bitter Springs. I have never been in the Northern Territory, and the information I have is obtained ritory, and the information I have is obtained from the reports of my officers. These reports show that the proposed extension will be 63 miles 65 chains in length, and the estimated cost £320,000, or at the rate of, about £5,000 per mile, of which nearly half will be for rails and sleepers. It will be possible to build the and aleopers. It will be possible to build the line in, say, eightoen months. There are no engineering difficulties, and there will be only one bridge of any consequence over the King River. This bridge, to consist of three 40-foct spans, will be constructed on concrete piers with stool girders. It will be a permanent struc-ture, and is estimated to cots about £1,290. The extension from Pine Creek to Katherine River is a single line with 60-lb. rails. It is being built in accordance with the provisions of the Act, so that it may readily be converted from the 3-ft.
6-in. gauge to a 4-ft. 81-in. gauge. All earthworks and waterways have been taken out in sufficient width, said the sleepers are sufficiently long to enable the line to be widered to the Commonwealth gauge. The traffic on the existing railway from Darwin to Pine Creek has been unduly infated of late owing to the carriage of material required for the section now under construction. I estimate the probable carnings of the new section by taking the earnings per mile of the existing line, and making a slight allowance for cattle traffic, which we expect when the meat works at Darwin are finished. I went into the matter, and I anticipate that the expenditure will be £11,800 per annum (traffic, locomotive, and maintenance charges), and that the carnings will be about £12,000 per annum, so that revenue and expendi-ture will just about balance. This does not provide for interest on capital. After the next section is completed, I expect the earning capacity of the railway will improve so that the extension will probably increase the traffic very considerably, as it will open up cattle and mining country. I cannot speak about the mining prospects, because I have no knowledge on that subject; but I know mines do exist, and I anticipate that they will be de-veloped as a result of this railway construction. My reports do not show that there is any special scarcity of water, as the country to be traversed is comparatively well watered, compared with the east-west railway, at all events. The material for the railway, rails and sleepers, are procurable in Australia now, rails being manufactured either at

Newcastlo or Lathgow. We call public tenders for sleepers, and get them from the different States. All this material is sent to Darwin by States. All this material is sent to Darwin by States. The first section of the railway from Darwin to Pine Creek is laid, with steel sleepers, and also portion of the second section, which we are now building, but after war broke out we were prevented from getting any more steel sleepers, because the price has nearly doubled. It is probable, therefore, that we shall be compelled to use wooden sleepers unless we can got the steel sloopers made for us at Newcastle. I do not think the difficulty with regard to white ants will be so serious on this section as on the first, because the rainfall is class. I know that several railway lines have been built in Queensland in country where the white ants are bad, and I understand that, although timber sleepers are used, they have not been destroyed to any extent by the white ants. As I have already said, I have no personal knowledge of the country, and I have to depend on reports from the surveyors, and Mr. Hobler, who went over the ground. We have about 500 men working on the section between Katherine River and Pine Creek, and we desire to keep those men employed, if possible. We do not wish to see any brake in the work between the two sections. Except in the case of certain Welshmen and Spaniards, the Department did not hay the ord of the men who are working there, nor was a guarantee given as to the longth of time they would be working. I expect that we will finish the earthworks of the section now in hand by the end of the year, and if no further work is authorized perhaps 160 men will be displaced, as we could not put them on work elsewhere, but the balance of the men will be ongaged in plate-laying and finishing up the line generally.

2. To Mr. Finlayson.—I anticipate that the section of the railway now under construction will be finished by about June, and if we were able to go on with the earthworks for the new section the plate-laying gang would be able to go right ahead. The terminus of the present section is across the Katherine River, because it would not be wise to stop the line on the northern bank of the river, as the people to the south would not have access to the line. This line is on the 3-ft. 6-in. gauge, and it forms a section of the north-south railway being projected to connect South Australia with the Northern Territory. In this proposed section, there is no deviation of the north-south line. The mest suitable point for a connexion with the Queensland system will probably be at Daly Waters, 367 miles from Darwin, and 100 miles south of Bitter Springs. Steel sleepers, of course, remove all difficulty with white ants, but they are fairly costly, and since the presents section was started they have increased in price from 10s, to 19s. each. We are now laying 50,000 powellized karri sleepers in the road, and in a little while I shall be able to state definitely how far powellising selficacious as a remedy for the white an difficulty. I know of no more expeditious way of transporting the materials for this railway than by steamer to Darwin. We have sufficient rolling-steek to handle the existing traffic, but as we come further south with the railway we will have to increase the stock.

As a matter of fact, a number of cattle trucks and ballast trucks are being built in Queensland for this railway, and I think there will then be sufficient to handle all the increased traffic on the extra 60 miles of line. These are the only additions to rolling stock which at present have been arranged for. I am informed that the railway will pass through pastoral and mining country chiefly, and that there is little prospect of agricultural development. It appears, therefore, that we will have to depend on the cattle traffic, and the development that may take place in the mining industry. At present, the cattle traffic over the existing line is very small, chiefly for the butchers at Darwin, but Messrs. Vestey Brothers are buildat Darwin, but aleasts, vestey brushes are built-ing meat works at Darwin, and they expect to be killing in March. While they are carrying out freezing operations they expect to truck about 320 head por day, and we are making preparations, as far as possible, to handle that traffic. When I said it would take eighteen months to build the proposed section of the railway. I meant that it would take eighteen months from the time wa start work. If I have authority to start this acction in the new year it will take eighteen months from that date to finish it. I am relying upon Mr. Hobler's reports in regard to the final route of the line. We have a railway surveyor there, a fully qualified man, and Mr. Hobler, who has been over the survey, is quite satisfied with the route. Mr Hobler will arrive in Melbourne today, so that, if the Committee desires, he will be able to give the latest information as to the route and the nature of the country.

3. To Mr. Laird Smith,-At the Katherine River, the telegraph line will be about 21 miles away from the proposed extension. I do not know whether King River is a permanent stream or not, but I imagine it is not. The line from Darwin to Pine Creek was laid down with steel sleepers 30 odd years ago, but the price recently rose too high to enable us to finish the second portion of the Pine Creek to Katherine extension with steel sleepers also. There are several hundreds of miles of steel sleepers in South Australia, and I think about 100 miles also in Queensland. Where steel sleepers are used the line does not "creep" very much. The proposed section from Katherine River to Bitter Springs will be a comparatively straight line, and what curves there are will be easy curves. The anticipated traffic will not warrant the use of heavier rails, as we are satisfied that the 60-lb. rails will carry the traffic for very many years. I might mention that the line to Bourke, in New South Wales, is laid with 60-lb. rails, and that a similar weight of rail is used for a considerable distance on the line between Adelaide and Melbourne.

4. To Senator Story.—We have had some difficulty in getting caphiles of rails and sleepers landed at Darwin Freights are very high, and alipping is scarce. I anticipate this difficulty will continue while the war less A steamer runs from Fremantle to Darwin, and we can get a certain on another of supplies up that way Then there are the Japanese boats trading to Darwin; but it is somewhat difficult nowadays to get a ship with a full carge. I dare say it would be worth while considering whother we could charter a steamer for twas purpose. I am sorry I cannot give the Commutes accurate details as to the ruling grade, but Mr. Hobler will be able to supply this information. I know the grade is an easy one. I made another is a second of the supply the sup

Newcastle, and learned that they have more orders than they can cope with for steel rails. I understand the paper bark tree —known as the giant ti-tree—growing in pertions of the Territory is not ant-proof, and therefore it would not be suitable for sleepers. The ironwood tree gives fine timber, only it is very scarce. I have been making inquiries as to whether sleepers could be got from this tree, and the engineer in charge of the line ins endeavoured to get people to quete for a sup-ply of these sleepers, but, so far, he has not been successful. I know that the white ants get into the paper bark tree quickly, and that it also be-comes affected with dryrot. I think 60-bb, rails are heavy enough to enable express trains to run over the line but this will despress trains to run over the line, but this will depend entirely on the weight of engine used. Provided that the locomotivo is not too heavy, there is nothing to prevent express trains running over a line laid with 60-lb. rails. For several years I have been looking into the question of using reinforced concrete for sleepers, and nearly every engineering periodical published makes some reference to this class of sleeper, but, so far, a successful design has not been perfected. It has been found that the vibration shatters the sleepers. Italy went in the vibration sinaters are steepers. Any removal age, and the other day I read in an engineering periodical that they had been taken out because they had proved unsatisfactory. I understand, however, they are used with success on street tramway, but it seems they will not stand heavy and fast railway traffic. They are also very heavy. An ordinary maintenance gang of three or four men would not be able to handle them, so a special gang would have to be employed to lift the line and pack it. In the estimate of cost of the section under construction, as well as the proposed section, there is included a charge of ld. per ton per mile for the carriage of the material, so that the further we get away from Darwin the more expensive will the cost of construction become. expensive will the cost of construction become. On the cast-west railway we are charging only 3d. per ton per mile, and that just about pays the cost of working. I cannot tell the Committee what is the freight by steamer from Newcastle to Darwin, but I will ascertain and let members know what we paid for the last coal we obtained from that port. I anticipate that the freight on rails from Newcastle to the head of the road at Pine Creek would be rather heavier than on coal. If you ask me for an opinion as to which would be the cheapest and best way to construct a line, whether from south to north, or from north to south, I would say that it could be constructed more cheaply from the southern end, but I have not gone into the matter. The rate of wages is very high in the north, and, of course, if the line very sign in the local, and, of course, it does not were started from the southern end, wages would increase the farther north we proceeded. At present, we are paying 18s. a day in the Northern Territory. We have not had very much sickness up to the present among the men. A few cases of malaria have been reported, but they have not been serious. If we started the line at the southern end we could land material more cheaply at Port Augusta than at Darwin, because vessels call at Iron Knob for ore for the Newcastle Steel Works, and the material would, in a sense, be back loading for them. I think, however, that the line constructed from the northern end will earn re-vonue more quickly than would the line from the southern end. because the meat works are established at Darwin, and, as a result, there should be a big cattle traffic. I have no person I knowledge of the curve in its vicinity of Macdonnell Range I have bority to se a survey

from Oodnadatta northwards to Pine Creek, and I am going to have an inspection of the country made. I hope to be able to go myself.

5. To Mr. Fenton .- The rolling-stock employed on the existing railway and that which we are having constructed in Queensland to cope with the increased traffic could not be converted to the 4-ft. 8)-in, gauge, but probably it could be sold to the Queensland Government again, as there is always a demand for that class of rolling stock.
The section under construction is being carried out by day labour, which is proving satisfactory. We have had very little trouble with the men. Recently their wages were increased very considerably. It is proposed to construct the section from Katherine River to Bitter Springs also under the day-labour system. The section under construction includes the cost of a bridge over the Katherine River, so the cost of a bruge over the Katherine River, so it would not be correct to say that the total of £320,000 which the proposed section is estimated to cost will include nearly £10,000 for a bridge over the Katherine. There is a deviation of the line there, and it is proposed to put in a low-level bridge until the line souverted to the 4-ft. 8½-in. gauge. This low-level bridge will carry the traffic in the meantime, and it will save about £40,000. If the high-level bridge were constructed, it would be on concrete pillars with steel girders, because the banks at that point are very steep. By a deviation, however, we can cross the river where the banks are lower, although the bridge will then be subject to occasional floods. It will be a wooden structure. There is provision only for a single line, and though the bridge could readily be duplicated, this will not be required for many years. At the point where the high-level bridge will cross the river the distance is only about 12 chains, and the deviation will increase the distance by about 2 miles. I have not heard that the Katherine River has double banks, and the plans show one big channel with a high level bridge across. The present section of the railway takes a south-easterly direction, as the country directly south is rather poor, the good country lying more in a south-casterly direction.

6. To Senator Keating.—The present terminus of the line is at Pine Creek, 146 miles from Darwin. We are building 57 miles extension at present, and the proposed further extension from Katherine River to Bitter Springs is about 64 miles in length. No provision is being made for future duplications. All platforms are on the rail level. There are several sidings and loops for passing trains, and, as I have said, there is provision for widening the gauge to 4-ft. 81-in. All the necessary loops and sidings will be provided for in the proposed extension. The bridge over the King River will be constructed of concrete pillars with steel-girders. This could be duplicated, if necessary. Where they have been tried, reinforced concrete sleepers have not been successful. I am told that a number have been tried in the Adelaide street tramway system. They have been tried elso in America and other countries, including Italy, but have not been a success, for I read recently that they had been taken out of the rail-ways in Italy. I do not know of any special conditions in Italy, as compared with Australia, that would make them unsuitable for railway traffic. Steel alcepers have been largely used in South Australia, and, to some extent, in Queensland. The steel sleepers used on the line from Darwin to Pine Creek are trough-shaped, and those laid from Pine Creek to Katherine River are H-shaped, almost like a rolled steel joist. In India, cast iron sleepers, known as pot sleepers, are used. There are no grades of any consequence on the proposed

extension, nothing steeper than 1 in 100. It is all even country, and therefore the curves are also very flat. From the information I have received I gather that the country from the present terminus to the end of the proposed extension is lightly timbered. The estimated cost is based on the actual cost of the section which we are now constructing, so the figures are quite reliable I get a monthly statement showing the cost of that work. From Darwin to Pine Creek the line is laid with 41-lb. steel rails. Eventually, when the guage is altered, it is proposed to have the whole line laid with 60-lb. rails. We are using 60-lb. rails on the section from Pine Creek to Katherine River. When the line from Darwin to Pine Creek to its reliable with 60-lb. rails the rails taken out might be used on branch lines, and for the loops and sidings; but the steel electerer could not be so used, as they were made for the narrow-gauge line.

7. To Senator Story.—The estimated cost includes ballasting with gravel We have allowed for 1,430 yards per mile.

8. To Mr. Finlayon.—The tracing I have exhibited indicates a branch line to the Marranboy tin-fields, but that is not included in the estimate. That branch line has nothing whatever to do with the proposal before the Committee, and it is shown on the tracing only as a possible route for a line to the Marranboy fields, a suggestion being made that there should be a 2 feet line to assist in the development of the fields. There is no proposition before us at present for the construction of that railway.

Atlee Arthur Hunt, C.M.G., Secretary Depart ment of External Affairs, sworn and examined.

9. To the Chairman .- I travelled through the 9. To the trainman.—I travened through the Northern Territory recently, but I did not go over the route of the proposed line. I left the railway line at Katherine River, and followed the railway line at Matherine fiver, and nonowed out track to the Marrauboy tin-fields, and thence I travelled to Bitter Springs, so I was not far distant from the route of the proposed extension. The impression I formed of the country was that it was good for stock-raising, but, so far as I could take not witchly for acciently a under present. judge, not suitable for agriculture under present conditions in the Territory The country im-proves very much as one gets down towards Bitter Springs, in the neighbourhood of which there is the Government sheep farm at Mataranka. The Government desired to ascertain whether sheep would do well in that part of the Territory, hecause no sheep had been raised nearer than Avon Downs, which is away down on the Queensland border, in about latitude 21 south. They pur-chased 2,000 sheep from Avon Downs, and these were taken in light stages overland to Bitter Springs, where land was resumed for the purpose of an experimental sheep station. The sheep arrived there in March last year, so they have been eighteen months on the property. So far as I could judge, they are likely to do very well, as they were in excellent condition, and the manager reported that, as far as quality of the wool is concerned, the experiment so far has been entirely satisfactory. When I was there they were lambing, and he expected a very fair percentage. It is hardly fair, however, to compare the conditions of that sheep station with the pare the conditions of that sheep station with the conditions of a properly-organized station in more settled country, because there are no fonces, and the sheep have to be shepherded. They are therefore moved about a good deal, and are not left to themselves as they would be on a properly equipped station,

but when I was there they seemed to be doing very well. In the neighbourhood of the Roper and Waterhouse Rivers I should say that there are admirable opportunities for small stock settleare auditratic enfortantices for small stock settlements, but I do not know that the country is so much botter than agricultural land in other parts of Australia that the settlers could afford to pay the difference in the rates of wages and cost of the difference in the rates of wages and cot of transport. The country generally from the Katherine River to Bitter Springs is open, and presents no engineering difficulties. Water can be obtained in most places by sinking. All the streams run only in wet weather, but in most of the country to the streams run only in wet weather, but in most of them there are holes which provide permanent water. I think there is nermanent water in such holes in Maudie's Creek.

10. To Mr. Laird Smith.—The King River is not a permanent stream, but like the others it contains waterholes where -ermanent water may be obtained. We camped for fitteen or eighteen hours at the King River alongside a good big waterhole, probably 50 yards long by 15 or 20 yards wide, and about 4 feet deep.

11. To Mr. Fenion .- We were at the King River about five months after last rains had

12. To the Chairman .- The Katherine River was a very tiny stream indeed when I was there, and it could be crossed on half-a-dozen stepping stones at the point where the road crosses it, the water course then being only 12 to 15 feet wide and a few inches deep.

13. To Senator Keating.—The rainy season extends from about the middle of November to the end of March or middle of April.

14. To Mr. Fenton .- Judging by its banks, the Katherine River must be an enermous stream in flood-time and at the point where the tracks cross I should say it would be about 90 feet deep, and at least a quarter of a mile wide.

ucep, and at teast a quarter of a mine water.

15. To the Chairmon.—In my opinion the oxtension of the line from the Katherina River to Bitter Springs would only be worst considering as part of some bidger scheme to connect the Northern Territory with South Australia or with Queensland. The line from Pino Creek to the Katherine River was essential to get stock from the the content was set of the view into Darwin. all the country south of the river into Darwin, because the country from the Katherine to Pine creek is difficult for drovers, there being practically no feed. In normal seasons, however, there is good feed for drovers south of the Katherine, so that the bulk of the stock at present pastured in the country to the south of the latitude of the Katherine could be driven to the terminus of the section under construction. During my travels through the Northern Territory I went from Parwin to Herbert's station, on the Adelaide River, from Darwin to Laurie's and Sayles's stations, also on the Adelaide River; from Batchelor to Stapleton, and through the country in that locality; thence I went to the Daly River, and back to Brock's Creek, and on to Mount Bonny. Afterwards I wont by sea to Rathurst and Melville Islands, thence to the East Alligator River to Cahill's station, and then across to Burrundie; and later from Pine Creek to the Roper mission station. The Mataranka country struck me as being the best, the timber there is of a finer type than elsewhere. I incountry struck me as being the best, the timber there is of a finer type than seawhere. I insenced several mining fields, particularly that of Marranbov. 60 miles south-east of the Katherine River This is quite an extensive in-field, so far River This is quite an extensive in-field, so far as I could judge, and the local mining people seemed very well satisfied with its prospects of

permanence. However, it is difficult country, and a good deal of capital will be required to develop it. The Government have erected a battery there for concentration purposes, and are propared to deal with any quantities of ore that may be brought in.

16. To Mr. Fenton .- The miners on the Marranboy field are chiefly Australians, but, generally speaking, they are not a good class of miners, being mostly of the old prospector type—men who discover fields and then start somewhere else.

17. To Mr. Finlayson,-There is practically no settlement in the country I traversed except at Marranboy, where there are a good number of miners, and the men connected with the Government battery.

18. To the Chairman .- Many of the miners who 18. To the Chairman.—Many of the miners who have heldings at Marrantoy have secured exemptions until the battery is in full working order, and in the meantime they are working in Darwin or arilway construction. Probably there are about 50 heldings, representing from 120 to 150 men. The proposed extension of the railway will assist the mining industry, because it will then be possible to get supplies up there more cheaply, especially if a transvay is constructed from the line to the field.

19. To Mr. Fenton .- The distance from the 19. To Mr. Fenion.—The distance from the proposed extension of the railway to the mining field is about 12 miles. The cost of transport to Marranboy is one of the difficulties that prevent its development. There is an extensive stretch of sand to cover, and teamsters have the utmost difficulty in getting through it.

20. To the Chairman .- I gather from our exports that there is excellent ore at Marranboy, and ports that there is excellent ore at Marianovy, and that it probably goes down to a considerable dopth, so I should say that the field will increase in importance in the future. It is not fair to comin importance in the future. It is not fair to com-pare the section at present under construction with that proposed to be constructed, because in the latter case the country is very much better in every way. The country improves immediately you get over the Katherine River.

21. To Mr. Laird Smith. — I am hoping, of course, that settlement will follow the line of the railway, but that has not been the experience in the Territory, and right from Pine Creek to Dar-win—a distance of 150 miles—you will hardly see a dozen houses along the route of the railway.

22. To the Chairman .- I think it will be the policy of the Department to extend the shoep farming experiment, though no decision on the point has been given yet. We are going slowly. I think it is desirable that we should have another couple of years' experience to ascerhave another couple of years' experience to ascer-tain if there is anything in the soil or the grasses that will interfere with the development of the industry. The land of the ironwood tree con-tains a rather bad poison, and shoep have to be kept off it. There may be other plants of a similar character, and of which we have no knowledge at present.

23, To Mr. Laird Smith .- The health of the mon employed on the railway will probably bear very favorable comparison with the health of men employed on railway construction anywhere else in Australia. The bulk of the men are Australians, but they are a mixed community along

single men who have their family connexions in the south. They work in that hot, uncomfortable country, and they get beds south as one as they caused the Russians will probably leaves as one as and the Russians will probably leave as soon as they have made enough money also, but the Malthey have made enough money also, but the Malthey have made one arrangement could be made teen may settle if some arrangement could be made to be suffered to the country in the world, I should say that the and Italians. These people such conference in the land. They seem to be keen about getting on the land. They seem to be keen about getting on the land. They are no working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea and they are working on the railway with the idea to travel. We used almost the travel. We used almost the same the impossible to travel. We used almost the proposition on my triple every known means of locemetion on my triple and they are the work of the proposition on my triple and they are the work of the proposition on my triple and they are the work of the proposition on my triple and they are the work of the proposition on my triple and they They seem to be keen about gettaing on the land, and they are working on the railway with the iden of accumulating a little money to enable them to do so. Most of them had very limited capital when they came, and the Department is encouraging them to work in this way so as to get money together, because from experience we know that men who go on the land without capital usually because Gragament, reminerar. Some of these become Government pensioners. Some of these people from South America have brought their wives and families with them, and at present there are about fourteen married women and sixty there are about fourteen married women and eirty children among them. I assume that when the proposed oxtension is put in hand these people will be transferred from the present work to the new section, and after they have carried sufficient money, probably they will settle on the land. They receive the same and of wages as shee mon They receive the same rate of wages as other men. They receive the same rate of wages as other menthy are all members of the union before they leave Darwin. We are not making any provision along the railway line for villages, because the country at present being traversed is too poor. The land improves from the Katherine River to Wilton Strain but the way who are likely to be. ano impreves trum the Adaptine state of the Bitter Springs, but the men who are likely to become sottlers have not selected any locality. We propose later on to arrange for a small delegation from these people to visit different places, and the selection from these people to visit different places, and there is a possibility of a sottlement being estab-lished over on the Alligator River, because there the transport will be by sea, and, consequently, cheaper than by rail. I might mention that I am preparing a memorandum for the Minister exan properties a memorandum for the prospects of pressing some general views about the prospects of settlement in the Territory. I do not see much hope for agricultural settlement. The existing line touches only one of the Government experimental farms. I refer to the Batchelor farm, the other farm is on the Daly River. The Batchelor farm is giving more encouraging results now than previously, but we have had no end of difficulties with the men. We have no end of difficulties with the men. We have a staff of only eight or ten men, but in the three years that have elapsed since the farm was established over 200 men have passed through it. Men come and take up work for a little while, then they go away again, or they get drunk and have to be discharged. We would gladly encourage married men to go there, but there does not seem to be any inclination on their nart to do so. The country is healthy their part to do so. The country is healthy enough, but it is certainly uncomfortably hot. The products of the farm are chiefly hay and fodder, and we are allowed to sell to anybody. Vestey Brothers are taking a fair quantity.

24. To Mr. Finlayson .- I was in the Territory 24. To Mr. Finlayson.—I was in the Torritory for about two months, from about the middle of August till the middle of October. During that time the weather conditions generally were suitable for travelling. We were blocked by rain once only for a few hours, but the weather was always very hot. From May or June to Soptember the conditions are reasonably good for travelling, I think, but it depends where you want to go in. From Santember to Deasuber the water ing, I times, out it depends where you want to go to. From September to December the water absence of permanent water. However, I saw begins to get very searce, but from about the some ideal country for dairying far away to the latter month, there is abundance; and besides east, on the Alligator River, but I did not

but unless regarded as part of the bigger scheme referred to I would asy that the extension to Bitter Springs until not be warranted. As a link in the chain the proposed extension is in its proper place. I do not think that the proposed around with advantage be diverted in any other decion. In view of the fact that the country south of the Katherine River is better and Katherine River is better and Katherine River and that stock could travel and that stock could travel for the country better River, and that stock could travel for the country between Rine Creek and Ratherine River, the oxtension of the clien to Ritter Smrings is unnecessary for the the distance to Katherine River, the extension of the line to Bitter Springs is unnecessary for the development of the cattle industry to the west. There is land along the route of the projected railway suitable for settlement, but I do not know if it is available. I know, however, it is occupied on conditions that will allow of re-sumption. The whole of the property at Mata-rable the cape of which is about. 760 senum. sumption. The whole of the property at Mataranka, the area of which is about 760 square miles, could be made available. I would not like to say, without looking at the detailed plan, exactly what land along the route of the railway would be suitable for small pastoral holdings. There does not appear to be much prospect of coal deposits being discovered in the locality. The Territory has been examined by geologists in many discovered the only coal deposits I have ever been examined by geologists in many direc-tions, but the only coal deposits I have ever heard of wore over on the west near Anson Bay. None of the geologist' reports speak of the oxis-nce of coal along the railway line or near it, so all the coal required for the working of the line will have to be shipped to Darwin. A cortain amount of work is being carried out with the shieet of discoverine minars in the Northern object of discovering minerals in the Northern object of discovering minorals in the Northern Territory, but our mining advisers recommend that we should work on the existing fields, and see if we cannot develop them to a lower depth rather than assist prespectors generally. In the neighbourhood of Pine Creek a lot of gold has been taken out, but the mines have mostly been abandoned at about 200 feet. The Governneen apandoned at about 200 rees. The Govern-ment are now putting down bores, and are sink-ing shafts, for the purpose of testing whether the lodes continue or not. I am preparting a report for the Minister giving my impressions, and this will probably be available in two or three weeks.

25. To Senator Story.—During my travels in the Northern Territory I saw very little tim-ber that would be suitable for sleepers, as most ber that would no suitanus for success, as most of its is liable to be affected by white ante as soon as it is cut. Only two timbers—the cypress pine and the ironwood—are not affected by white ants, but they are not found in great quantities. The but they are not found in great quantities. paper-bark tree, I am sure, is not white-ant resisting. It is a hard wood, and well suited for buildings, if it is kept off the ground to prevent the after from getting in. I had no opportunity of seeing the country south-west of the Katherine River, where large numbers River, where large numbers of cattle are raised; but from what I could gather from the settlers it is not suitable for closer settlement, owing to the

F.16003.-B

hear of any suitable country near Wave Hill or Victoria Downs. I met a number of people who came from there, and they told me they had difficulty about the water supply. Vestey Brothers, I know, are spending a lot of money in making wells. I do not know of any country on the railway line suitable for co-porative dairying, though it is possible this might be successful near Mataranks. Attempts have been made to secure water by boring in the country south-west of the Katherine. It would be quite possible to have a branch line west from, say, Daly Waters or Newcastle Waters, to accommodate the Wave Hill or Victoria Downs country, and I know this line has been talked about.

26. To Senator Keating .- In my travels I was close to the route of the proposed extension along its entire length, and having in view the ultimate linking up of the north-south railway, I have no doubt that the route selected is the best one. The cypress nine is not grown to any extent in the country over which I travelled. I saw only occasional patches of it. It is indigenous to the Territory, but that subject has been mentioned as one to be dealt with in the future. It has not been overlooked, but up to the present we have hardly thought the time had come to deal with it. Inquiries have been made in tropical countries concerning the cultivation of white-ant re-sisting trees, but I do not think our reports are in yet. The cypress pine is a very strong-smelling wood, and it has a remarkable edeur when burning, but it does not seem to be so highly impregnated with turpentine as doce the Huon pine of Tasmania. The rainfall in the coastal areas is fairly heavy, averaging about 65 inches, but it gets lighter inland. At Bitter Springs the gauging shows 30 inches. Generally speaking, the rainfall is not nearly so heavy as in the greater part of Papua, which is in nearly the same latitude as the north of the Territory. The rainfall at Bitter Springs would be good if it were more evenly distributed. The ques-tion of water conservation has been discussed. but the evaporation in the Northern Territory is tremendous, and it would practically be necessary to cover all the reservoirs. The question of water conservation has been looked into by some of our surveyors during the past two or three years, especially in the Adelaide River district, but we have never had water conservation experts there. The land in the Adelaide River district is very good, and no doubt there are possibilities of agricultural development, which would be worth considering at a later date. The country I travelled over was not heavily timbered except in a few patches, and there is very little jungle country similar to that met with in Ceylon or in Papua. Generally speaking, it is more like our ordinary open lightly-timbered country. Not 1 per cent. of the distance I covered was over formed roads, I suppose that for fully three-quarters of the distance I travelled by motor-car, and there ought to be no considerable engineering difficulties in railway construction. The creeks along the proposed section are small, and the country is fairly level. You could go in some districts for probably 25 miles, without a rise or fall of 15 feet. On the existing railway there are two trains each way per week running regularly, and what are called special freight trains, perhaps, on two other days per week.

27. To Senator Story.—Mr. T. Day has recontly completed a Journey from Oodmadatta to Darwin. His particular mission was to examine the country north-east of Alice Springs, but he continued the journey right through. I do not think he could give you any more information than could a dozen other men regarding the country between Katherine River and Bitter Springs, I know, however, that the manager of the sheep farm, Mr. Watson, could give reliable information.

28. To Mr. Finlayson.—The water at Bitter Springs is highly mineralized, but is suitable for stock and demestic purposes.

#### (Taken at Melbourne.)

MONDAY, 15th NOVEMBER, 1915.

Present:
Mr. Ritary, Chairman;
Senator Koating,
Senator Story,
Mr. Fonton,
Mr. Fiulayson,

Rowland James Evans, Superintendent of Existing Lines, Northern Territory, sworn and examined.

29. To the Chairman.—I have been in the Ter-ritory two and a half years. All I have to do with the construction branch is to forward supwith the construction branch is to forward sup-plies. We stack in the yard material arriving at Darwin, not having enough rolling-stock to send it straight through. The material for the construc-tion to the Katherine now going on is all in the yard or on the spot. There is none there yet for the proposed extension to Bitter Springs. I have been over the new section to the Katherine, and as far as Marranboy on the next, but not to Bitter Springs. I am told that the country is much the same as I saw as far as Marranboy. comparatively level, very small grades, and only three water-courses of any size to cross-King River, Maudie's Creek, and another. No great engineering difficulties are presented. On the section to the Katherine there are plenty of watercourses close together, so that the water trouble is not at all acute. That does not apply to the next section, as the streams are further apart. The most comfortable time for the Committee to visit the Territory will be about March, avoiding November, December, and January, which are the wettest months. May is the coolest month. The Katherine, which is the worst stream, can be, and is, crossed by boat oven in the height of the floods, Near Maudio's Creek is a 6-mile patch of black Near Manager's Greek is a o'dinio patent of black soil, impassable in rain, but soon drying. The heat in the wet months is very moist, but the clouds tomper the sun's rays. The Burns, Phillp line is the best to use from Brisbane to Darwin. Their boats leave Sydney on the first of each month. The Committee could hardly visit Bitter Springs and return in time to catch the same boat that would be three weeks. It would take back—that would be three weeks. It would take from Darwin to Pino Creek on day, to the Katherine two days, and to Bitter Springs (by buckboard), two days. The line is being built with steel sleepers on the straight runs, but on the curves we are putting in powelized karri. The Traffic Superintendent at Darwin has put some of these on ant beds. The annua stateked the sleeper underneath at once, and for some time it locked as if they would as thread it but time it looked as if they would go through it, but

they eventually abandoused it. All the effect was a very slight piercing where they tried to get through it. In my opinion, the powellised karri is impervious to white ants. Their attacks that not affect its stability in any way if could not be said that it was even properly pierced. I could not many much in favour of the sired sleeper which is practically avertaing, especially the newest pairer, made on the grader principle, with a wide flange at the bottom and a narrower one action, enabling effective packing. The older sleeper was concave and thinner. Steel sleepers in the existing line, where well-covered and away from the sea air, are as good now as on the day they were put in. Those exposed to the sea air near Darwin have lad to be replaced. The steel sleepers canno from America direct to Darwin, and the rails from England. The steel sleepers canno from America direct to Darwin, and the rails from England. The steel sleepers canno from the steel sleepers and February lack, on contracts let prior to the war. They are pierced for the 3.ft. 6.n. and 4.rt. \$\frac{1}{2}\times \text{in}, \text{ gauges, and as from \$\frac{1}{2}\times \text{ in, oxta is wanted on the curves, weaden sleepers have to be used there. The landed cost of the steel sleeper has gone up to 19s. each, that would be prohibitive. They are not bulky, and do not contain very much steel. They could easily be made in the Commenwealth. The new girder type is the best I have ever seen. The Territory railways show a loss overy year, thus:—

2 * 4110 **	. 1033 011	, ,	,	
Year.	1	levenue.		Working Expenses,
1910-11		£ 11,520		£ 16.320
1011-12		13,207		18,768
1912-13	•••	14,397	•	17,063
1913-14	***	17,819 22,140	***	22,991 26,992
1915-10	(estimated),	33,000	•	44,343

We have 116 miles in use, and 59 to 60 under construction

30. To Mr. Gregory.—The revenue includes freight for the new construction. In 1914-15 is included about six months' traffic in construction material, bringing in about £6,000. We charge a special rate of 1d. per mile per ton for this.

31. To the Chairman .- But for replacing obsoleto engines, which might have been done years ago, we would have shown an excess of revenue over working expenses. The interest bill is £46,299. Under South Australian control the line never showed a profit. The working expenses per train mile had not been calculated for 1914-15. before I left the Territory. The previous year they were 10s. 8d., and it is anticipated they will be reduced to 5s, for the current year. Pre-viously the line was starved; within the last year violisty the line was surved; within the isses year the rolling-stock has been improved. We had Class W Beyer Peacock engines, a number of which were condemned by the boiler inspector, and replaced by Queensland type B 13. We now have three B 13 and four W locomotives. These are enough to do the present work, but not to handle the extra meat traffic, for which thirty Queensland bogie cattle trucks are ordered. Twenty of these have been already delivered. When the meat works are erected I think the railways will show a profit over working expenses. The estimated revenue from the meat traffic in the first year is £12,000 for five or six months. Besides cattle traffic, there is traffic for the mining fields. The line to the Katherine will bring in a little revenue that we would not otherwise have got, but beyond the Katherine, outside of the Marranboy tin-field, I do not think there will be any traffic coming in at all. The proposed line will help to develop the Marranboy field, of

which I have a high opinion. It is a poor man's field. The battery is about ready to start crushing, and a fair population, running to several hundreds, can be maintained. Many of the miners are now working on the railway line, waiting for the battery to start. There are more than forty shows registered there, all working on lode tim. It is essentially a leatthy district.

22 To Mr. Laint Sm.th. — The Darwin-Pine Creek line was built thirty years ago, and zone of the steel sleepers are as good as new. As a self-contained proposition it would be absurd to build the new sections, but they should be built as a part of the through line from north to south. No deviation towards Queensland is suggested or possible until after Bitter Springs. We are now running flying maintenance gangs of four men for 25-mile longths. The work is light. The water is good, and does not affect the boilers. The engineer expects the Pine Creek-Katherine River section to be onen for traffic next June, but that does not include the tomporary bridge over the Katherine. The station will be south of the Katherine. The fine the work are at Darwin, to which the live stock will be railed, some from Fountain Head and some from the Katherine. The meat works proceed as yellow will kill 250 head a day during the consignation of the works are at Darwin, to which the live stock will be railed, some from Fountain Head and some from the Katherine. The meat works proprietors asy they will kill 250 head a day during the coming scason; when the Katherine section is one they will probably kill 500. We are getting now the full ton mileage out of the engines. There is no back leading, but the working expenses are bound to drop with the extra train mileage. The powellised deepers are bound to give better results in ground which is not known to be infected with white ans than when put on an ant bed, but no one could prefer them to steel Leepers, wheit are everlasting, except that higher speeds can be got on wooden sleepers. In the Argentine, where cathle trains are run through at 60 miles an hour, the steel were replaced with wood. There' are no sand hills or clay beds on the entrees. We have had trouble with the Queensland engines are good. The Byer-Peaceck engines were built for the time.

33. To Senator Story. - The Marranboy field 33, 75 Senator Story. — The Marranov heid has been proved tin bearing, 6 miles by 3, with payable propositions all over it. Samples like the one now on view in the Department of External Affairs are common. About 16 per cent, tin is wanted to make the field payable. Later, with the railway, it is possible a lower percentage will pay. The field will pro-bably support several hundred men. The cypress pine, ironbark, and ironwood, all more or less antproof timbers, grow in the Territory. The paper-bark is good, but not absolutely ant-proof, and the quantities available are not great. There are forests of cypress pine, some distance from the line. A saw mill there would pay only if a line was run out to the forests. Cypress pine is too short in the grain, and splits when the dog spikes are put in. Ironwood makes an ideal sleeper, and we have used it as a crossing timber. The freight on the first lot of rails and sleepers from England was 19s, per ton; that was a specially low freight-The powellised sleepers came direct from Bunbury round the north-west coast. The increase in the railway revenue is due to the operations of Vestey

Brothers, and the construction of the Pine Creek-our speed in the Territory does not give us an op-Katherine line. The cost, in my opinion, portunity of testing this point. I should say Katherine line. The cost, in my opinion, would be approximately the same to construct the line from the south northwards as from the north southwards. When the line from Oodnadatta reached the Macdonnell Ranges it would be reproductive, but the country between is very poor. To start from the south would develop the Macdonnell Ranges country quicker. Freights for a long sea journey to Darwin or Adelaido would be about the same. If Broken Hill rails were used it would be cheaper to build from the south. I could not say whether the Oodnadatta climate is better to work in than the Community chimate is better to work in than the Katherine, but I know that the climate at Bitter Springs is fairly good, because as you go inland from Darwin you get altitude.

34. To Mr. Sampson. — The country is only grazing along the new line. Everything goes to prove that, except for the Marranboy field, there will be practically no new leading for the new line. The cattle will be driven in to the Katherine from the stations, the lowest of which is Wave Hill I have heard discussion as to the advantages of a line to the cattle country around the Victoria River. It is good cattle country all through there, but it would mean a very wide deviation. The line to the Katherine has not given any impetus that I know of to cattle raising. As soon as it is comploted the stations will send the stock to the Katherine, and they will be railed stock to the Authorities, and they will be familited thence to Darwin. I can supply the Committee with figures showing the revenue from the dif-ferent classes of goods carried over the existing lines for the last three years. We have had to take some concrete sleepers out of the road near the jetty already. They are too unresponsive. These were an imported make.

35. To Mr. Finlayson.-There is no urgency for the construction of the new section, except as a means to the completion of the through line, and incidentally to keep men employed. It is not justifiable from a traffic point of view at present, but it is imperative to build it in order to get the through line. Very few interests will be acreed by the Bitter Springs extension. I doubt if it will cause any increase in the cattle traffic. The miners at Marranboy are all looking foward to the building of the line, which will give some impetus to the mining industry. If steel sleepers could be manufactured in Australia at a satisfactory price they would meet our purpose.

36. To Mr. Gregory.—I cannot see where any new settlement is to come from to the south-east of the new line. I do not know that it will open up any further cattle country. That will all depend upon the extent to which the meat works are able to take the cattle. Later on Vestey Brothers may kill 700 head a day. They expect to be killing next March. It may not be generally known that they have bought up all the station properties round about, and if any one else went there to start cattle-growing they would probably buy them up also. Some of the shafts on Marranboy are down 40 feet or 50 feet. The 10-lead hattery is quite big enough to cope with any probable population that the field will carry. There is not a sufficient quantity of timber to use as fuel on the locomotives. There is not sufficient ironwood available for sleepers. I would not say that ironwood was impervious to white ants, but it is ant-resistant. For a recent contract we had to go 2 or 3 miles away from the railway line to get the quantity. Engineers say the steel sleeper is too rigid for high speeds, but

that steel and concrete sleepers were on a par as regards rigidity. Concrete sleepers could be made at certain centres along the track. Fortyeight thousand powellised karri sleepers have aloghic thousand powenteed karn steepers have air-ready boon sont to the Territory. They are in-voiced as karri, and the engineers have inspected them and declared them to be karri. I was sur-prised to hear that karri sleepers had been chosen, because I know that jarrah is a better wood to put because I know that jarran is a better woot to put in the ground. They arrived in February, and those I mentioned have been lying on the ant beds for about eight months, and have been in-appected once a month since. We have not tried to treat sleepers locally to make them ant-resistant, but Mr. Gerald Hill is making experiments in the Department now in regard to various

37 To Mr Fenton .- Practically none of the 57.000 cattle experted in 1913 was carried on the railways They evidently went into Western Australia from the Territory, and were shipped Australia from the territory, and were suppod at Derby or Wyndham The proposed section will touch some of the buffalo country, but the buffalo are not there in great numbers. There are more of are not there in great numbers. After are more of them in the country along the open line. Some parts of the buffale are fairly good eating, and I believe the proprietors of the meat works contemplate putting some of them through for frozen meat, but they are mostly killed for their hides.

38. To Mr. Finlayson.-The grinding of the brasses on the B 13 engine is considerable where a grade and a curve occur together. Our grades and curves are not very severe, and it is only with that part of the engine that we have had trouble. but it was solely on account of the length of the wheel base.

39. To the Chairman. - The country round Mataranka, where the experimental sheep farm has been established, is very good sheep country, and will be tapped by the new line.

(Taken at Melbourne.)

MONDAY, 22nd NOVEMBER, 1915.

Present .

Mr. RILEY, Chairman:

Senator Keating, Mr. Finlayson, Senator Story, Mr. Gregory,

Harry Vivian Francis, Assistant Engineer, Commonwealth Railways, sworn and examined.

40. To the Chairman,-I was in the Northern Territory as Superintendent and Resident Engineer of the Darwin to Pine Creek railway for three years. I have been back in Melbourne over twelve months. I travelled over the proposed new section from Katherine River to Bitter Springs; my furthest south is Milner's Lagoon. With reference to the "westerly awing" shown on the map, as recommended by Mesers, Clarke on the map, as recommended by Messers. Clarke and Lindsay, two mombers of the Royal Commission for the Northern Territory railways and ports, starting from Katherine River, passing through the fringe of the Victoria River district, and rojoining the telegraph line at Renner Springs, I understood that the majority of the Commission recommended as direct a line as possible which would breach of from Plan Cropke. sible, which would branch off from Pine Creek or

Brock's Creek direct south, but the usual impres-Brock's Creek direct south, but the usual impres-sion in the Territory is that the country im-mediately south of the Katherino telegraph sta-tion is of little value, as no one has attempted to take it up. I know of only two lhocks taken up; one occupied by a man who calls himself Duggan, but whose real name is Gonghan, and another taken up by a man thance Kruper. In 1902, Allan Davidson worked his way out from Barrow's Creek, and found "name" and back Atlan Davisson worked ms way our from Barrow's Creek, and found Tanami, and back to Kelly's Well, and he gives anything but a bright description of the country. The route of the telegraph line is the one most nearly adopted by everybody concerned as a railway route, giv-ing some chance of settlement, and along which there would be water for at least the greater part of the way. From Newcastle Waters across to the Victoria River Downs station is a very . dry track, with 70 and 80 mile stages without ory traces, with 70 and 80 mile stages without water in a dry year. Some part of the country is spinnifer, which is supposed to be good for steek. The Hon, John Lewis has a largo place at Nowcastle Waters, with good water supply, but the water supply to the supply of the water supply. this, and places like it, are all on the telegraph line, or east of the line. There is no one setfled on the western side until you reach the Victoria Downs. The direct south route, therefore, has never appealed to persons in the Territory. The Commission, which I met out back, prepared a map showing where they had been. According to this, they went to the east, and were never in the western part of the country at all. Neither Messrs, Clarke and Lindsay, who were the ma-Jority, nor Mr. Combes, who was the minority, saw that country at all. It is not understood why they recommended that deviation, unless for why they recommended that deviation, unless to directness, and cortainly the westerly swing, as shown on their map, is by no means direct. A ccientific expedition consisting of Dr. Gilruth, Dr. Breinl, Dr. Woolnough, Professor Spencer, and others, some years ago examined the Roper River country lying to the east of Bitter Springs, and made a report on it. Their guide, Mr. Alfred Giles. also wrote a series of articles, but the greater part of that country is still not taken up. It is permanently watered all the way along by the Roper River, and offers an opportunity for the letting of a large number of blocks, all well watered on at least one fringe for a start. It is supposed to be a good class of country, and all who have been over it speak well of it. Bitter Springs, being the source of the Roper, is the head of that country, so that the Katherine to Bitter Springs extension would undoubtedly tap it. Another point in favour of the Bitter Springs line is that it will serve the Marranboy tin-field, which, as soon as the battery is started, will probably be the biggest mining field atarted, will probably be the biggest mining in the Territory. When I was there the prospects were very promising, and a large number of men were working on the field. The Bitter Springs line goes within about 9 miles of Marranboy, but the swing to the west would put that place right out of court. The Bifter Springs line catches the Roper River country, Hodgson Downs, Nutwood Downs, and good country extending down to Anthony Lagoon. Most of the country south of Anthony Lagoon would send cattle through Camcoweal to Charleville and other railway stations, Queensland, If water was available, cattle could be driven from Anthony Lagoon up to Bitter Springs. We ought to draw cattle from country for at least 300 miles south-east of Bitter Springs. I think that trade would make the Bitter Springs railway a better paying proposition than the Katherine River sec-

tion is likely to be. Bitter Springs is also closer to Wave Ilil station and the Victora River district than Katherino is, and Wave Ilill is practically the home station of Vestoy Brothers, who are putting up the meat freezing works in Darwin. From Bitter Springs to Wave Hill is about 220 miles. At present, cattle are driven from Wave Hill to Wyndham, Western Australia. There is a good deal of inducement for fresh settlement on the Barkly Enblelands, where a large amount of the land is beld under permit, while, as I said, the Roper country is practically unsettled. These are points in favour of the more easterly route, whereas the last part of the Victoria River Downs country is let on forty-two-year leases, which have a long while to run, although I presume the Government would have powers of resumption there as elsowhere. The Bitter Springs extension is certainly more reasonable than that from Pine Crock to Katherine, which is a necessary length in the scheme for a north-south railway, but which the scheme for a north-south ransway, but which passes through what is well known as poor country. The Bitter Springs extension takes the railway into country that offers better prespects. After the rains there is a fine growth of grass at Bitter Springs, and it is more like what appears to be good agricultural country further south. We had no wooden sleepers in the Territory when I was there. Steel sleepers were being sent there after I left. The trough-shaped steel sleepers have been in the old Darwin-Pine Creek line for thirty years, and have stood well, except near the coast, where some of them have correded. It is hard to say whether the ants would destroy untrented wooden sleepers. There is always will keep them from going through the sleepers. will keep them from going through the sleepers. In a line running from Cocktown, in Queensland, wooden sleepers have stood very well in similar country, yet I believe only about two or three trains a week run on the line. Ironwood is not absolutely immune to white ants. If there is a pipe in the centre, the ants will start on it there. We used to fill the centre with concrete. The ants do not care about iron-wood, but will eat it. If steel sloopers can be obtained at a reasonable price, there is no question which we should use. The Katherine to Bitter Springs section is very easy from an engineering point of view, but just after leaving the Katherine there is a large belt of limestone coun-Katherine there is a large both of innestone country consisting of high limestone rocks with sharp pinnacles. This presents considerable difficulty with this country in our survey as far as Bacon Swamp, after which we get into casy country. We got the survey through there before I left the Territory. That limestone would be very suitable for ballnst, if blasted out, and will be probably used there.

41. To Senator Story .- I know Mr. Pearce, who suggested to the Commission the direct south who suggested to the Commission the direct south line from Brock's Creek. He is the owner of Willeroo Station, and the line goes straight through his property. He is an estimable and honest man, but that consideration would undoubtedly influence him, for a man would be foolish to fly in the face of a possible railway through his land. He has lived on Willeroo for a good many years, and I dare say he would not mind getting out well. This may not be a charitable suggestion, but it counts. If the agreement between the Commonwealth and the State of South Australia is binding, as we have always been given to understand, we must either follow the telegraph line, or endeavour to find a route which will secure for the Commonwealth one of the two best

natches in the Territory-the one on the cast, consisting of the Barkly Tablelands, with Authony Lagoon in the centre, or the one on the west consisting of the Victoria River district. Some of the Victoria River district trade is already secured by Wyndham, Western Australia, and practically all that district is already taken. up My opinion, therefore, is that the nearer we go to Anthony Lagoen the better chance we have to secure the best portion of the Territory. If we take our line close to the Victoria River district we shall come into competition with Wyndham, but at present no one else is after the Barkly Tablelands trade, and the Katherine to Bitter Springs section must be part of any line intended to tan that country. A line towards Anthony Lagoon would get the Alroy Downs country, and all the country lying south of that to Alice Springs. A flying survey was made by Lawrence and Chalmers, from Anthony Lagoon to Camooweal. An excellent alternative suggestion has been made for a line midway between the telegraph route and Anthony Lagoon, and running through the Frew River station. This would not divert too far from the direct route, and would still tap the Barkly Tablelands. If the only object was the connexion of Port Augusta and Darwin by as short a route an possible, I should say on a straight as you can; but we must try to pick up some trade on that big length of trad, and we should not get the best revenue returns if we went through the unoccupied country to the west of the telegraph line. I would recomthe west of the telegraph line. A would recommend the shortest possible route compatible with the idea of developing the country, if this is to be a trans-Australian line carrying express trains, but the more easterly route is still the better, especially in view of the fact that Port Augusta is more to the cast, and to reach it it is not necessary to go straight through Alice Springs. The line from Port Augusta to Codnadatta is nearly nne from Fort Augusta to Councidate is nearly on the 138th parallel of longitude as far as Hergott Springs. A line from Port Augusta or Hergott Springs, coming up through the tableland, is still more nearly direct, leaving the western country further out than over. I do not think there would be greater engineering difficulties in getting through the eastern side of the Macdonnell Ranges These ranges tail out on the eastern and as shown by the run of the watercourses towards Lake Eyro, which is below to level. The telegraph line goes through nearly the highest portion of the Macdonnell Ranges. A line from Kingoonya to Boorthanna is a fairly direct north-south line. That is one of which we have had a trial survey running from 210 miles from Port Augusta on the east-west line in an almost direct northerly direction. Boorthanna is 60 or 70 miles south of Oodnadatta. That line would offer the most direct route. If that was adopted the telegraph line would be the nearest to make a direct connexion.

I believe the greater number of the advocates of a through line would be well pleased with the tele graph route rather flan to see it moved further to the westward. There is a general belief in the Territory that the westerly land is net very good, as shown by the fact that it is almost a'so lutely unoccupied. Dr. Chewings went to the west of the line, and his account of it is no better than Davidson's. We are not likely to escure the trade of that part of the Victoria River district which adjoins the Western Australian Loundary, for

Vestey Bros, have bought Copley and Patterson's and Buchanan's station properties in the Victoria River District, but even though they own the meat works at Darwin, I do not suppose they would run their stock from that country to Dar-win if it paid them better to send it to Wyndham. If the track is good, and the grass good, owners will not entrain their stock until the last moment. If they want to get them to the freezing works, and the grass is not good, they will put them on the train at Bitter Springs rather than at the Katherine. For at least four or five months of the dry season, they would prefer to put the cattle on the train at Bitter Springs. The freez-ing will be done in Darwin during the dry season, and the cattle will be coming in as long as the works are running. During the heavy wet the cattle could not be got to the railway station. The cattle trade will mean considerable revenue to the Bitter Springs section. So for as revenue from the Marranboy field is concerned, I thought very highly of the field when I was there. It was on extremely promising tin proposition, but it had been hung up for a long time owing to the alow arrival and crection of the battery. The men had been starred out, although the storkeepers to the batter of the b had been backing them for a long time. One storekeeper at Darwin was £1,000 out of pocket when I left there. Now that the battery is nearly completed, Marranboy should go ahead. A number of the men on the field would get employment on the railway line if they could secure exemptions, which I understood that Dr. Jensen was willing to recommend. It is a big field, comprising 40 square miles of tin country, all prosnected, and with shows all over it. They talked of supporting from 500 to 1,000 men there. If it is likely that 150 men now employed on the Pino Creek-Katherine River section will be thrown out of employment in the event of the Bifler Springs section not being gone on with for the next six months, I do not think that they can be profitably absorbed by the Marranboy field, for I doubt very much if any of the miners can afford to employ labour at the present time. When I was there they were all working miners, and practically dethey were all working miners, and practically devoid of money. These who have been making wages on the railway will go back to their claims as soon as possible, but the trouble is that the nen who will be put of the railway works would probably not be the best class of workmen, and the world be difficult for the railway works would probably not be the best class of workmen, and it would be difficult for other industries to absorb them. The battery should give employment to about a dozen men. There are other fields between Bitter Springs and Darwin worth prospecting, but, unfortunately, not during this period, as the "wet" has started. If these 150 men were turned off in June or July, I should say yes, but not now. Between Pine Creek and the Katherine the grass is about 12 feet high about the time when these follows would be let go Not much prospecting can be done under those conditions. The wet season terminates about March. The Committee could travel to this part of the country in the middle of March, although the weather will still be hot, and March flies and other pests troublesome. I put ou crete sleepers in at Darwin, but they were not a success. The manufacture was not good, and they falled where we expected them to fail. They did not stand under the tail at the rail scat. I am aware that concrete sleepers have been tried successfully in the Adelaide tram lines, but the that cattle country is within fair walking distance axle k ds on a train line are much lighter than (for eattle) of Wyndham. I have heard it said that we cury on our railways. Concrete sleepers have been tried a great deal in America and in Italy. I know they have not yet been successful in

43. To Mr. Gregory.—It is hard to say whether the added traffic on the line to Bitter Springs will make the railway pay working expenses; but there will be undoubtedly an improvement at Marranboy, and more pastoral land will be leased. Alarranboy, and more pastorni rand will be leased. As soon as people know the line is going to Bitter Springs, I am certain there will be considerable endeavour to lease land along the Roper and in the vicinity of Bitter Springs. All this means pastoral, as well as mining, traffic, and back loadpastoral, as well as mining traile, and back loading for the stations. I framed all the freight charges for the Territory. Our charges are 26 per cent. in excess of the southern States, for both fares and freights. When the railway is completed to Bitter Springs, I anticipate considerable cuttle trails. The Katherita is what we call bad helding country during the dry season. For several months in the year the mailman can. For several months in the year the mailman cannot feed his horses there. That is not the case at Bitter Springs, which is on the Elsey Station. This was at one time a fair-sized cattle station, and was held for years. Droving to Bitter Springs instead of Katherine will save at least Springs instead of Katherino will sive at least ten days in the journey from Wave Hill, and that makes a great deal of difference in the dry season. The country between Katherino and Pino Creek is very poor. In the old days cattle were loaded at Fountain Head, Nearly all the existing mining in the Territory is just on the eastern side of the Pino Creek to Katherino section. The question whether the line recommended by Mr. Combes, from Authou, Langua to Post Markhur and the from Anthony Lagoon to Port MeArthur and the Pollow Islands is more likely to develop the Territory than the north-south railway has never cropped up, because we have always been under the impression that we had to make the northsouth connexion in accordance with the agreement with South Australia. To open the Barkly Tablelands by a line to Port McArthur and the Victoria River country by connexion with Blunder Bay would develop the country quicker, but the extension to Bitter Springs is still justified. In stopping at the Katherine we are not stopping at a good place, nor are we opening up any good country. When Mr. Thomas was Minister of External Affairs he asked me to map out a railway construction policy for the Torritory-a very difficult thing to do, unless you can put the northsouth railway aside as a matter for the next generation. If we must connect Port Augusta and Darwin by virtue of the agreement, we must find the best route to serve as much country as we know will help the line. If the Territory could be developed in an entirely different manner, and without considering the agreement, I would develop the Barkly Tablelands, and then develop the Victoria River country, if we could resume sufficient land there; but I would not go into the Victoria River country at the present time while it is held, as it is now, in enormous areas on long leases by people who are not doing a tap to develop it. There are certain development conditions in the new leases, but not in the old ones. The present holders of the Victoria River distriet have an extremely good proposition at a very cheap rate. I was very sanguing about the Marranboy field when I saw it, and I have had. considerable experience as a mining engineer. I walked over the field 8 miles one way and 5 miles the other. I saw at least fifty claims opened up. These were on quartzite lodes, and some of

the better class tin ran very high. On examination, it was estimated that a large part of the lodes should run up to 10 per cent. of tin, which, with tin at its present value, means a very payable proposition. The rock country is very good, and I doubt if much timbering will be wanted. If there is, there are good forests of the best cypress pine I have seen, near Marranboy. Sinking on pine 1 nave seen, mear antramody. Sharing of the lodes means sinking in hard country. A 10-head mill will not keep many big sliows going; but if a number of good claims were proved, it would not be long before another battery was provided. The lodes I saw were of considerable length. It is easy in places to see from 200 to 300 yards of tin lode in front of you with shafts sunk at intervals. Unfortunately, the experience of concrete sleepers everywhere has been bad. The or concrete steepers everywhere has been bad. Americans have not yet got the concrete sleepers out of their railway yards, and they have been trying to make a good concrete sleeper for a long The Bessemer and Lake Eric line had 1,500,000 steel sleepers in two years ago, of the Carnegie pattern, which we are using on the new line. The ironwood sleeper is very hard; but the trees do not grow to any dimensions, and are nearly all piped. I made two tests with powel-lised sleepers when I was at Darwin. In the first laid several test specimens made up of a block of untreated and a block of treated timber on an ants' nest, with a space between them. The ants went through the powellised block, but did not ent it. They cleaned out the untreated block, leaving it a mere shell. The second test consisted in laying powellised jarrah crossing timbers in the road, partly in Darwin and partly at Boomleers, along the route. So far the crossing timbers have not been touched by the ants. We have tried a large number of specifics which will keep the ants away so long as the specific hats on the outside of the timber. If you can get impregnation that will stand, the ants will leave the timber alone.

43. To Mr. Fonton.—I am quite prepared to believe that all the Victoria River country is much under stocked. It is not fenced, and has practically no improvements in the way of water. If they have a bad year, the stock must be all in on the water. Cattle can be driven from the lower portion of that district to Wyndham for 5s. 6d. per head, and put on the boat there for another 1s. 6d. The Wyndham works are a State enterprise; but there is at present some difficulty over the contract. From Wyndham to the boundary is about 100 miles, and to Wavo Till about 200 miles. We might get the traffic from the Victoria River Downs Station, which belongs to the Bovril Estates Limited, and perhaps also the cattle from Wave Hill Station, which Vestey Brothers are understood to have purchased. It is reported that Vestey Brothers have spent about £2,000,000 in the Territory. If it paid them better to send their cattle to Wyndham, I do not suppose they would consider their own works in Darwin; but Darwin, as a port, is incomparably superior to Wyndham. Ships of 30-ft, draught go into Wyndham, but they have to sit on the mid for twelve hours out of the twenty-four. At Darwin we have a depth of water running from as high as 46 feet at the top of the spring tides, to as low as 21 feet at the bottom of the neap tides. The captain of the Empire reported to me on one occasion that he was on the hottom drawing 21 feet; but I think that was on silt. I have measured as low a depth

very much against the big boats, until the marinors learn to sit the boats on the mud, which does them no harm. A dredging proposition at Darwin would not be difficult. I do not know that the better shipping facilities at Darwin would industrial to the state of the state induce stock-owners to drive their cattle further in order to reach that port; but the droving would not be so bad to Bitter Springs as it is to the Katherine or Fountain Head. Cattle can arrive at Bitter Springs in good condition. The Port McArthur railway proposition requires a careful survey of the bottom between the mainland and the Pellew Islands. Mr. Stretten, at one time Chief Inspector of Aberigines, Sub-Collector of Customs, and Harbornaster, knows Port McArthur very well, and he would not say that it was the best port in the Territory. To take the main trunk line from Kathorine River to Oodnadatta, via Renner Springs and Alice Springs, would be to follow as nearly direct a route as is consistent with engineering considerations, and would give a length of about 1,020 miles. I would be agreeable to taking the line that way if the country to the west of the telegraph line could be shown to be of any value. The fringe of the Victoria River district touched by Clarke and Lindsay's westerly swing is an expensive country for rail-way construction, as the heads of a number of rivers have to be crossed. The Pine Creek to Katherine River section will cost, in the long run, a little over £6,000 a mile to construct. It comprises some fairly heavy work and heavy bridging. That estimate will, I think, cover the low-level bridge across the Katherine. I think the line should be taken to the south side of the Katherine for that amount. I told the Commission that if we were building that railway from Katherine to Bitter Springs in the south, in the same class of country, we would build it for £3,000 a mile in the Southern States: but we have to carry all our materials, and at the same nave to carry m; our materians, and at the same time pay 15s. a day in wages. Mr. Combes esti-mate of £6,000 a mile was for a 5-ft. 3-in, gauge. The Katherine to Bitter Springs section will be constructed for much less than £0,000 a mile. There is only the King River to cross, requiring about 120 feet of bridging.

44. To Mr. Finlayson.-The lower portion of the Victoria River country belongs, geographically, to Wyndham. The Vesteys will not let the cally, to Wyndham. The Vesteys will not let the whole of the Victoria River district trade go to Wyndham if it means impoverishing their freez-ing works enterprise at Darwin. When the line is built to Bitter Springs, mobs will be held there which cannot be held at the Katherine after June. Aluel, of the trade of the Roper River and Barkly Tableland country has to go at present through Queensland. A line running a little further east than the telegraph line would catch that trade, The suggested swing through Anthony Lagoon would be a little too wide, and would leave a greater portion of the Territory out of the track; while the telegraph route will be too far away from the Barkly Tableland, much of which is good sheep country. The Government experimental sheep station, on the Waterhouse near Bitter Springs, is a little too high in latitude for sheep, and the country round there is not good sheep. country. You do not get to good sheep country until you get below Anthony Lagoon. I believe that the leaseholders would surrender portion of their land for railway purposes, as one of them told

as 6 feet at the wharf at Wyndham. This is the Commission. A large number of men holding country there have had bad times for many years. Some time ago, in good years, stock was so low in price that it did not pay. I see no objection to the Bitter Springs extension. It is a neces-sary link in the southern connexion, and the better part of the country that we can tap lies to the south-east. Liaif the Victoria River country is lost to us already, and the other half does not come back to us for many years. The immediate construction of the Bitter Springs extension is a fluancial question. If there are good financial reasons for not going on with it, that stops it; but if we stop railway construction at the Katherine, we stop the north-south railway, which we believe must come eventually, and which is quite as justified as an east-west railway. If it has any justification at all, the north-south railway should be built, even if it has to be done a little nt a time; but if we stop it at the Katherine, we lose the lot. If it is extended to Bitter Springs

it will be a more payable proposition.

45. To the Chairman,—If there is no prospect of the gauge being altered for the next fifteen or twenty years, I should advise the use of 3-ft. U-in, sleepers, that is, if wood sleepers are used. The difference in the longth between 4-ft. 8½-in, and 3-ft. C-in, would probably save £150 a mile. It would be wise to construct the earthworks, bridges, and culverts wide enough to take the wider gauge at the start. The saving in length would probably be from 1s. Cd. to 2s. per sleeper, and we use about 2,040 sleepers to the mile. The life of the Carnegie steel sleeper should be at least from 60 to 100 years inland, but I understand that the price has become almost prohibitive.

46. To Senator Story.—The Roper River is navigable for a short distance for boats of small draught. It could be made navigable at great cost. If the through line is completed the traffic from north of the Macdonnell Ranges will probably go to Darwin, and that from the south to the ranges about Barrow Creek is fairly barren. It is hard to say whether the line should be constructed from north to south or from south to north. The development of the Macdonnell Range country from the south would give the Oodindatta line some mining and pastoral traffic. We anticipate a little mining development in the Davenport country, about 150 miles north of the Macdonnell Ranges, but a large area further north would for some time be a drag until we got in touch with the downs to the south of Anthony Lagoon. Then we might expect a return going to Port Augusta. If we stopped the line at Katherine, we would be repeating the mistake that was made at the South Australian end by stopping at Oodnadatta, which is practically the Sahara of South Australia.

47. To Mr. Gregory.-If necessary, we could bring our rates for tracking cattle down to the Queensland rates. On our present rates, it would cost about 30s., and on Queensland rates about 18s. per head for 300 miles of trucking, speaking from memory. The Queensland rates might be a bit less with their big trucks. They carry cattle in that State between 400 and 600 miles. Two or three years ago a beast worth £3 on the station cost about 6s. to put on the boat at Wyndham. The same beast would be worth £6 at the freezing works at Wyndham or Darwin, Owners can therefore afford to pay freight for cattle to be run fast into freezing works.

#### TUESDAY, 23nd NOVEMBER, 1915 Present:

#### Mr. Rikry, Chairman;

Senator Keating, Mr. Finlayson. Senator Story, Mr. Gregory, Mr. Fenton, Mr. Sampson.

George Alexander Hobler, Construction and Maintenance Engineer, Commonwealth Rail-ways, sworn and examined.

48. By the Chairman .- Last Christmas, I was over the country covered by the section of this line. I have not gone into the question of revolue. The country throughout, from Katherine to Bitter Springs, is easy construction country, with no engineering difficulties of any consequence. The earthworks generally are light. The only bridge of any size is over the King River. That is a bridge of three 40-feet spans on concrete piers. There are a few miner bridges, and a few concrete lox drains. The country from Katherine to within a few miles of Bitter Springs Ratherino to within a few miles of Bitter Springs is, I should say fairly good pasteral country, improving as it nears Bitter Springs, and around Bitter Springs itself. It also passes within 12 miles of Marranboy tin-field. I went through the Marranboy tin-field, and from what I could hear there appears to be a large extent of tin-bearing country with very good propects. The Government have there erected a 10-bear at successful property of the property of th head stamper battery. From conversations I have had with several of the leaseholders of mines, I should be inclined to consider that the prospects of Marranboy are very good. The great com-plaint was the difficulty and the high price of cartage for supplies, and the consequent link price of cartage of tin from the mines to Kathe-rine River. At that time the Katherine River railway was under construction, and it was known that the line would eventually come to Katherine; but the road from Marranboy to Katherine River is not too good for teams. In the wet weather, for several months in the year, it is practically impassable for teams. During my visit, there was very good feed for horses between the Katherine and Marranboy, but I was there at the best time of the year. I was told that for cight months in the year there is very little feed indeed on the read, and feed is scarce at the time of the year when the road is most fit for team traffic In my opinion, this section of railway will have to be constructed no matter what deviations may take place afterwards. If the line is to connect with South Australia, the section between Katherine River and Bitter Springs is undoubtedly a part of that route. I have seen the map and report by Messrs. Clarke and Lindsay, but, personally, I have not seen the country on that route. I consider that it would be inadvisable to bend the line to the west. The Victoria River and Sturt's Creek district would be far better served with a separate railway system or branch line later on. It would be better to have that than to bend the main line, which would mean only a partial development of the country; it would not develop it so well as would a branch line. The question is still undecided whether Wyndham might not prove to be the natural port of the district. The Department does not propose to follow the alterations as shown on the map to which you have referred. It is proposed to follow the present overland telegraph line to Bitter Springs, and probably to Daly Waters. After Daly Waters be engaged between the end of the year, when the question will arise whether the route should the section under construction is expected to be

bend towards the east from there, or whether it should still continue along the overland telegraph line to Newcastle Waters. At present, from information I have, and from what I have seen, I am melined to think that, on investigation, it will be found that Daly Waters will probably be the point at which the line should bend to the east, with the idea of keeping closer to the proposed connexion with the Queensland system at Camooweal and also to keep in better country Camowesi and and to keep in meter country on its way south. I consider it absolutely certain that we are on the right route of the main line so far as Bitter Springs. I have only made one visit to the Territory, and that was last year. I travelled from Pine Creek to Bitter Springs along the proposed railway route and back through the Marranboy district, and thence to Katherine River. I went about 10 miles south of Bitter Springs. As to which part of the Territory should be developed first, the local development of the Territory must necessarily be considered to a certain extent in connexion with the main route south, Still, if one were confined to the local development of the Territory itself by a railway system, it would entail a considerable amount of investigation which, at the present time, I have not personally gone into. I have not the personal knowledge to enable me to express an opinion. On the Katherine to Bitter Springs extension it is proposed to make the earthworks of sufficient width to take a 4-ft. 81-in. road, and put sleepers wants to take a 4-11. 84-in. road, and put sleepers in of sufficient length to widen out from the 3-ft. 4-in. gauge later on. So far, we have had no absolute tests of the life of wooden sleepers in the Territory. But if the best class of hard-wood is used, and the attacks of white auts are not worse than they are in the white ant infested country in Queensland, I should consider that wooden sleepers would have an average life of between fifteen and twenty years. I should not like to say, or express an opinion, when the construction of a 4-ft. 81-in, line would be completed. Under the present circumstances, in view of the war, such a railway might be demanded at a very early date, but, on the other hand, it might not be required for a considerable number of years. The difference in the cost of using the 3-ft. Gin. sleeper as against the 4-ft. 81-in. sleeper, would be about £180 per mile. This would make no difference in the rate of construction. The difference means about is. 9d. a sleeper, That would mean 7 feet x 9 inches x sleeper. That would mean 7 feet x 9 inches x 44 inches for the 3 ft. 6-in, gauge as against 8-ft. 6-in x, 29 inches x 5 inches for the 4 ft 84-in gauge, allowing 2,080 sleepers to the mile 1 profer not to express an opinion whether the long one or the short should be used, as that is a mater of policy As to a branch line to the tin-field, the country from the junction with the main line to Marxahov is seceedinely easy It has good sandy formation, and there are practically very few waterways. There is only one bridge over the Roper Creek, and a line could be laid with light rails; it could be easily and cheaply over the hoper creek, and a the could be laid with light rails; it could be easily and cheaply constructed. I think that such a line would be a great help to the development of the field. I have no estimates as to the number of people likely to be employed on the line, or to live about the neighbourhood. It would take about eighteen months to build a line from Katherine to Bitter Springs, and that would mean that the men now employed there could be kept steadily on. There is no work that I know of in which 150 men could

completed, and when the new section would be started. So far as I know, the men there at the present time employed on the railway would be entirely dependent on such work if they are to continue in the Territory. From a railway point of view, it would be advisable to keep these men employed, but I am unable to say whether there is any work other than railway work for them in case of a temporary costation of the latter. I could not say whether Messa. Vertay Brothers could absorb some of the men. That depends entirely on whether Vestey Brothers have sufficient truey on whether vestey brothers have sufficient men at the present time, or whether they intend to add to the buildings they have in hand. This firm had only just started when I was there, and very little work had been done to the building at the time. Most of the timber used by Vestev Brothers for the buildings was being imported from the south, but I understand they were get-

49. To Senator Story .- It is still a question whether powellised sleepers are effective against attacks by white ants. There has been much controversy on this point. We have not had an opportunity of thoroughly testing the powellised sleeper in the white-ant country. We have a good number of such sleepers laid on the east-west line; but they have been there such a short time that it is impossible to express an opinion as to their resistance to white ants or dry-rot. In my opinion, the Northern Territory is infinitely worse for white ants and dry-rot than the country through which the east-west railway The use of these powellised eleepers is really an experiment. We are using about 40,000 powellised karri sleepers on the section between Pino Creek and Katherino River. Steel sleepers are very hard to procure, and the price is about double that of the normal market, presumably on account of the war. The life of the steel sleeper is a great deal longer than that of a timber sleeper, even though it be powellised. For instance, steel sleepers at present used on the Darwin-Pine Creek line have been on the road just about thirty years, and, with the exception of about 5 miles of the line from near Darwin and the sen atmosphere, the sleepers are still in an excellent state of preservation. No one could say whether it would be possible to obtain steel sleepers made in Australia within the next twelve months. These sleepers and powellised karri sleepers are being used on the present rec-tion from Pine Creek to Katherine River. The first portion of the road is laid with steel sleepers, and after that come the timber sleepers. We procured a certain number of steel sleepers, which were used first, and then the karri sleepers followed. It is my opinion that the section of the line now under investigation is necessary as a part of the transcontinental line, whatever deviations may be made later. It would be advisable to get a report from the Engineer-in-Chief as to the desirability of first constructing a line to the Marranboy tin-fields, and then concurable. There are many circumstances to be considered, and I think the answer to the question asked requires some preparation. I should be inclined to say myself that the line should not stop short of Bitter Springs. The line now proposed is 12 miles from the Marranboy tin-fields, and this, of course, means 12 miles of cartage, unless a branch time is built. In any case, the necessity for a branch line into Marranboy should be considered in connection with the further development of the cost considerably more to divort the line via

mine after the main line to Bitter Springs is actually built to the point of junction. The building of the line from Katherine towards Bitter Springs will necessarily bring it within 19 miles of Marranboy, whereas with the line finished at Katherine it will be 46 miles from Marranboy. Necessarily the extension of the line from Katherine to Bitter Springs will bring the line so much nearer to Maranboy, and that in itself, without a branch line, will assist very considerably in the development of the tin-fields. The question then arises whether the expenditure on a cheap branch line to the tin-field itself would be warranted. At Bitter Springs there are better facilities for entraining cattle, and there is a good water supply for a township. The surrounding country is better, and the line is brought nearer to the cattle stations south and south-east of Bitter Springs. Further, the line is in a better position to assist in the settlement of Roper River lands. Roper River starts at Port Roper, in the Guif, runs due weat right to Bitter Springs, where it turns round and runs north-west for some distance, following within a few miles of the route of the railway from Katherine to Bitter Springs. I have been on the Marranboy tin-fields, and I can say that they are fairly extensive. From what I could see there was a considerable area of tin-bearing country. I think that if a line were run into the tin-fields it would assist greatly in the development of the field. I am not, however, in a position to say that the extent and value of the tin-field at the present time would be sufficient to justify the construction of a branch railway, when a main line of railway can be constructed within 12 miles, allowing future developments to show whether the contruction of a branch line is warranted. I do not consider that any great advantage would be nained by the construction of a section to Marranboy as a terminus. In my opinion, there is land there suitable for agriculture later on. Until the railway is opened right through from either Queensland or South Australia there is no market. As to the class of agriculture. I should think that maize, for one thing, might be grown; but I do not think it is a wheat country, seeing that the rain comes at the wrong time of the year. But tolucco, and other tropical and semi-tropical produce, night be grown. I know neiling personally of the land north of Oodnadatta.

50. To Mr. Finlayson,-There is need for this railway extension, for one thing, as part of the north and south transcontinental line. There has also to be considered the development of the country to the south of Bitter Springs and along the Roper River. As an individual proposition, I think that the extension of the Katherine River to Bitter Springs railway is justifiable, apart from the transcontinental railway. At present the railway steps at an inconvenient place. In my opinion, the country is much better from Bitter Springs southward than it is at Kathorino itself; and, quite independent of any junction with the north-south railway, this railway ought to be built. We have also to take into consideration the assistance it will prove to the development of the Marranboy tin-field. From Katherine couthwards I consider the country fairly good pastoral country, and there is an improvement when we get within a few miles of Bitter Springs. The country at Bitter Springs is better than it is along the route. It would Marranboy to Bitter Springs than it would to build direct to the latter place, and subsequently build a branch line to the tin-field. The distance would be increased very considerably, and the line constructed would have to be a standard one, thus increasing the cost, while later a cheap branch thus increasing the cost, white later a cheap branch line could be made to the tin-field. Such a deviation would also bring the line into country requiring very heavy cardiworks and expensive bridges. Altogether, the deviation would be ex-ceedingly expensive as compared with the present route. I consider that the country to the south-west of Katherine River could be better sorved by a branch railway, because that branch could be extended in any direction and to any length that would be desired to serve the country. On the other hand, the bending of the main trunk route would only partially serve the country, and could never be carried any further except by starting, from the point reached, a branch railway. I cannot say whether the general character of the Victoria River country is easy or character of the victoria liver country is easy of otherwise for constructive purposes, because I have not been there. I should prefer steel sleepers to the H pattern, which we are using in the Northern Territory; I am impressed with that sleeper. I would not say that I prefer them to any class of wooden sleeper, but I am impressed with the fact that it is most suitable for a climate like that of the Northern Territory, where we have to contend with white ants. I would prefer steel sleepers at the present time, if they could be stoel sleepers at the present time, it they come be got at a reasonable price, until we got further south. I do not think that anything would be gained by putting down a cheaper line with evoden sleepers as a temporary measure until ated sleepers are available. I do not think that the later processing the state of the conbe got, practically, any cheaper than those we have already taken into consideration. There is very little difference in the cost of laying such sleopers, but there would be an extra cost of adzing in the case of the half-round sleeper. In any case there would be very little difference in any case mere woun to very attre discrete in the matter of price by using the half-round sleeper. It is very hard to say what that "little difference" might be; we should have to call ten-ders in order to find out. Personally, I consider that the use of half-round sleepers should not be allowed for any railway in Australia, because it has caused the destruction of millions of feet of our very best timber. It has caused the destruction of young trees that would have eventually produced immense quantities of timber. The use of such elegers means the detraction of the best trees in the timber forests of the States. I estimate the saving on the square sleeper for 3-ft. 6-in. gauge at about 1s. Od.; but I doubt whether the half-round sleeper would prove to be any cheaper at all. I do not think that any of the States, except Queensland, have used the halfround sleeper. I consider the II steel sleeper an improvement on the trough sleeper. These sleepers are not available just now, except at a very high price, and, so far as I am aware, they could not be manufactured in Australia at the present time. I think it would be impossible to get such sleepers at the present time, especially in this country. A permanent survey has been made for the extension from Katherine to Bitter Springs. A trial survey has been made from Bitter S1 ings towards Daly Waters for a distance of about 25 miles, and the permanent survey for the line should be built as cheaply as possible, but

about 12 miles. The permanent survey is proceeding on towards Daly Waters. We have approval to go only as far as, Daly Waters. It will take nine months from now to complete the permanent survey with the present strength of the party. I should say that the Pine Creek to Katherine River section will be open for traffic soon after the middle of next year, and in this I include the construction of the low-level bridge now to be built over the Katherina River. The idea is that the staff chould continue with the work on the extension to Bitter Springs, as the work finishes on the Pine Creek-Katherine section.

51. To Mr. Gregory.—In addition to consider-ing the route of the railway, I also get a general idea of the pessibilities of traffic and the opening up of the country—as to the possible places of production and the likelihood of making the railway a paying proposition. I have only gone into the question of other ports than Darwin in a general way; I have not had an opportunity to consider the matter to a sufficient extent to enable me to give the Committee any detailed information. So far as I know at the present time, only tion. So far as I know at the present time, only anall craft of light draught go up the Roper with provisions for the settlers. The Victoria River, I should say, is navigable for boats of from 5 to 10 tons. I think that the building of this line, with a view to opening up new country, would be justifiable. It would depend considerably on the class of country how far hard the providerable of the contract of the class of country how far hard the considerable on the class of country how far hard the considerable of the class of country how far hard the considerable of the class of country how far hard the class of country how far hard the class of country how far hard the class of the class of country how far hard the class of the class of country how far hard the class of the we would be justified in carrying railways inland for the purpose of transporting stock to the seaboard. In some cases stock-owners might prefer to travel stock in good seasons, and take them by train over poorer parts of the country. I think, however, that it would be quite justifiable to deal with cattle country situated 500 miles from Darwin. It would be opening up a very large question to talk of extending that to 1,000 miles. A great deal depends on local cir-1,000 miles. A great deal depends on local circumstances when you begin to negotiate such long distances. I should say that, in view of the country I have seen as far as Bitter Springs, it would be quite reasonable to truck cattle for 500 or 600 miles for the sake of bringing them to market quickly. Approximately, the distance from Barkly Tablahands to Darwin would be 500 or 600 miles, and I take it that seek could be trucked that far. If a high price is given for no now or wow mues, and a take it that stock could be trucked that far. If a high price is given for stock, that is an inducement to earry it a long distance, and I think you would be quite justified in anticipating a cattle traffic of the kind I have indicated So far as I know there is no possibility of oil or coal for fuel being found locally in the Northern Territory . the only prespects I have heard of are for copper, tin, and gold. We could get a considerable quantity of firewood, but in ordinary railway working it is somewhat doubtful whether it would pay to use firewood as against coal. On the ballast train we are using principally coal and firewood mixed. At the present time I am not able to say whether that mixture is cheaper than coal, but we have the matter under consideration. If it is possible to use the rise and fall of the tides for the purnoso of generating electricity, it ought to be applicable at Darwin, because there the rise and fall is considerable. That is a matter for electrical experts. For the purpose of cheap freights and making railways pay, it is ersential, in the case of an ordinary railway, that

that is in the case of a line which it is not anticipated will be a main trunk line. As trade warrants, such lines can be built up; and I would adopt that principle to a reasonable extent in a main trunk line, in the way, for instance, of using low-level bridges over big rivers. It may be found economical to use low-level bridges over the big rivers in constructing the main trunk line from north to south. It is a very doubtful point whether, given a life of fifteen doubtful point whether, given a me of meet, to seventeen years for wooden sleepers, it would pay to lay 7-feet sleepers instend of 8-ft, 6-in, sleepers. That is really more a question of policy. The ballast does not come right out to the end of the sleeper; one end is covered, but the other is uncovered. The widening of the line will eventually be done with one rail only; we shall not shift any oc done with one ran only; we shan not same both rails. The sleepers will not werp, because so much will be covered with ballast. This does not mean much heavier ballasting than for the ordinary 3-ft. 6-in, line, because the ballasting is kept the same width as for that line, 60-lb, rails are being laid. With the present traffic, 45-lb. rails would be ample, but we should have to use more sleepers. We should approximately have to uso 2,640 sleepers with a 41-lb. rail-it is not a 45-lb. rail—as against 2,080 sleepers. It would not be advisable to go in for the lighter rail. Using the heavier rails, we decrease the cost of maintenance considerably. I do not consider there will be any saving in using a 41-lb. rail; with a 60-lb. rail we use fewer sleepers, and the maintenance is cheaper. Further, when it became necessary to widen the gauge, you would have to lose a big proportion of the cost of the lighter rails. I think that the weight of the rails used on the Cloneurry railway, in Queensland, is 42 lbs. On a good many of the lines in Queensland they are using 60-lb. rails, which were considered the best for the Queensland gauge. In fact, when I left Queensland it had been decided not to import any more 42-lb, rails. They were then taking up the 42-lb. rails on the more busy lines and putting down 60-lb. rails, utilizing the former for very light agricultural branch lines where there was no anticipation of their becoming main lines. I have heard of the concrete sleepers used on the Adelaide tramways, but I have not seen them, and, so far as I know, no investigation has yet been made by the Commonwealth Railway Department. I have investigated some concrete sleepers that were laid down on the Northern Territory line, and they were an absolute failure. The trouble is that the concrete, no matter what the reinforcement may be, appears to fracture under the running of the trains. I certainly think it would be worth while to investigate the effect of the concrete sleepers laid down by Mr Timms in South Australia some eighteen months ago; and we shall probably gef reports regarding them. Sleopers on a railway have to stand much greater shock and strain than on a tramway. I very much doubt whether it will be possible to make concrete elepers more cheaply than wooden sleepers. The reinforcement costs money, and, apart from that, the sleepers are very heavy to handle. Concrete sleepers have been very much discussed of late year, in relation to all railway operations, but up to the present there is nothing to show that they have been an absolute success anywhere. We have reduced the size of the sleepers from 0 ft. x 10 in. x 5 in. to 8 ft. 6 in. x 9 in. x 5 in. The

present price of the powellised sleeper and jarrals sleeper runs from 7s 0d, to 7s, 9d., and up to 8s, 4d.; but I should like to make myself sure as to that, because the prices vary. As to my figures in regard to the two difto my figures in regard to the two dif-ferent gauges, I may any they are the result of actual tenders called. The prices alter very much, and of recent years they have gone up. The powellised sleeper generally runs to 1s. or 1s. 2d. more than the unpowellised. We have some thousands of powellised sleepers up there, and I take it that Mr. Bell recommended that they should be sent. I remember hearing of a report about some untreated karri sleepers being shovelled off the Great Southern line in Western Australia. There has not been sufficient time to show whether the powellising process will prevent dry rot. The sooner we have some decisive experiments the better, because in the meantime a great deal of controversy exists. Nothing will prove the value of the powellised sleeper except an actual test. There are already about 40,000 powellised sleepers up there. When the estimate was made out for this railway we proposed to put either steel sleepers or powellised karri sleepers in, but what will be recommended is a matter that lies with the Engineer-in-Chief.

52. To Mr. Fenton. - The construction of the Pino Creek to Katherino River line, oxclusive of rolling-stock, will cost approximately £6,000 per mile. That is slightly less than the original estimate, because we have eliminated high-level bridges over the Cullen and the Edith Rivers, thus effecting a saving of about £20,000. The Katherine River to Bitter Springs extension will cost about £4,938 per mile, or £1,000 per mile less than the Pine Creek to Katherine River extension. The £6,000 per mile which the Pine Creek to Katherine River extension is costing includes the cost of erecting a low-level bridge over the Katherine. The height of this low-level bridge has been fixed at just above the normal flood mark, and when floods exceed that normal height they will go right over the top of the bridge. Low-level propositions of this kind have been used very considerably in Queensland for a great many years, and experience has proved that they have withstood floods very well indeed. We anti-cipate that the low-level bridge over the Katherine will be equally successful. It is a somewhat more difficult proposition than is the usual low-level bridge, but I have no doubt that it will stand equally well, and that it is well worth the risk. From what I have seen of Mr. Combes' report, I take it that he looked at this railway rather from the stand-point of the local development of the Northern Territory, and without considering it as a through connexion to South Australia. In paragraph 7 of his report he states-

The railways routes that would best develop the northern portion of the Territory, and also give most promise of (in time) turning out payable propositions, are as under:—

In saying that, he was confining the railway propositions entirely to the northern part of the Northern Territory, and was regarding only local development, and evidently not looking at the matter as a through line proposition. I know Leaving out of consideration the question of the that he also says—

The proposal to extend the Darwin-Pine Creek railway through the Katherine, Bitter Springs, and Newcastle Waters to Anthony Lagoon (and Camooweal) will not stand Investigation.

In doing so he appears to eliminate the idea of a line going to South Australia. He has not indicated a route to South Australia. If he had in mind a line from Darwin to Camooweal, with a branch from Anthony Lagoon to the mouth of the McArthur River, his proposition would then fit in fairly well. But if he wished to connect the Darwin line with a line from Anthony Lagoon to Camooweal, he would have to branch off somewhere—if not at Newcastle Waters, probably at Daly Waters, 100 miles north. In my consideration of the Katherine River to Bitter Springs line, I always had in view the fact that a transcontinental railway has to be constructed from north to south, in accordance with the agreement entered into between the Commonwealth and South Australia. I do not say that that line must be from Pino Creek to Oodnadatta, but it must be from Pine Creek to South Australia. I thoroughly believe that the construction of a line from the Katherine River to Bitter Springs will not only be in conformity with that agreement, but will assist development of the Northern Territory. I consider that the Commonwealth will be absolutely on the safe side, so far as the route is concerned, in constructing the line to Bitter Springs.

53. To Mr. Sampson .- The country surroundbo. 70 Mr. Sampon.—In comm.; surroun-ing Bitter Springs, though not of the best, is fairly good pastoral country. Within 4 miles of Bitter Springs an experimental sheep station has been established, under the care of the Administrator, and when I was there had 1,000 sheep on it. About 10 miles south is the Elsey Creek, and towards the western border of Queensland the country has been more or less taken up, and is stocked. The old Elsey station is only a few hundred yards off the route of the proposed railway. Stock could be travelled from Bitter Springs to the Katherine in a good season, but in the dry portion of the year it would not be good business. The feed would be scarce. The best part of the year in which to drove stock covers two or three months immediately succeeding the wet season. As far as I could ascertain from inquiry, the grass lasts for two or three months after the wet season. It commences to grow vigorously with the first rains of the year, which generally take the form of thunderstorms, and set in about November. From that time onward it continues to make rapid progress during the wet season, which ends about the gress during the wet senson, which ends about the middle of March. For a couple of months subsequently there is good feed. From that time onwards however, the grass begins to dry up. It can be burnt about May. It will be seen, therefore, that stock droving would be practicable for, say, four to six mouths of the year. From what I have seen of the country near Marranboy, there is some good agricultural soil, but it is patchy. Owing to its isolation, however, there has never been any agricultural operations in that locality which would form a guide as to its produc-tion. My own idea is that tropical and semitropical agriculture could be carried on there if markets were available. The markets which I have in my mind are those of Queensland and South Australia, but the best oversea markets for agricultural and pastoral products would on the

construction of a main trunk line to South Australia, I consider that the extension of the line from the Kutherine River to Bitter Springs is thoroughly justified on its merits. The building of that extension will bring the line closer to the Barkly Tablelands, which, I am told, is the best portion of the Northern Territory, and also to the settled land on the Roper River and on the Elsey Creek. I cannot say off-hand what revenue the proposed extension is likely to carn, but certainly that information could be obtained by ascertaining the number of stock on the different stations in the vicinity and estimating the proportion of that stock which would be attracted to the railway. The line would undoubtedly attract new traffic, as well as assist in new settlement. If I were supplied with details as to the number of stock in that portion of the country, and the area of occupied lands, I could form an estimate of the probable traffic. This information could be obtained from various officials in the Torritory, although its acquisition would take a little time. I have read the report of Messrs. Clarke and Lindsay on the Northern Territory railways and ports, and I am aware that they recommend-

(1) That the main trunk line be continued from the Katherine River to Oodnadatta, rid Renner and Alice Springs, as nearly direct as is consistent with the best engineering and revenue producing considerations, and that the construction be commenced from both ends.

(2) That the Victoria River district should be served by rallway connexion with Darwin as its natural and most convenient port. Preferably the connexion should be made by a westerly swing of the trunk line southwesterly from the Katherine, passing near Willeroo, thence to the telegraph line at about Renner Springs.

I have not seen the country to which they refer, but, judging from the map, and keeping in mind the country to be traversed on the castern side of the overland telegraph line, I have no hesitation in saying that it would not be a good proposition to bend the line to the west in order to bring it nearer to the Victoria River country. I would prefer to bend the main trunk line to the east of the overland telegraph line, and to serve the country in the neighbourhood of the Victoria River and Sturt Creek by means of a separate or branch railway system. The bending of the line to the west would give only a partial connexion with that country, whereas a branch line could be extended to any distance that might be required to develop it. I consider that an extension of the develop it. I consider that he extension of the line from Bitter Springs to pass somewhere in the locality of Anthony Lagoon should be thoroughly investigated, as I believe that the bending of it east to that point, and thence following as nearly as possible a due south line to Oodnadatta, or perhaps to Hergott Springs, would take it through the greatest area of good land. That route should be thoroughly investigated before the Commonwealth is committed to following the route of the overland telegraph line.

- 54. To Mr. Fenton.—There is a very extensive cypress pine forest in the vicinity of the Marranboy mine, so that there would be a fair amount of timber traffic until the forest was cut out. The area embraced by this forest is several square miles.
- 55. To Mr. Gregory —The line could not be taken further east just there, because the route is on the edge of a very large area of flooded country.

which I have referred is of first rate milling quality The trees are of fine size, and the timber quanty increased of most size, and no tables area could be advantageously tapped at the present time. Roughly speaking, it would support a saw-unil for a few years. I have no great noise of afforestation in the Northern Territory. The timber there does not grow very symmetrically. solidly, or of great size. When one gots away from Darwin, it is of too crooked and stunted a growth. The ruling grade on the line is 1 in 100, and the sharpest curve has a radius of 40 chains, 67. To Senator Story.—The earthworks on the Pine Creek to Katherine River line will be completed within the estimated cost. I recommend that the trunk line should be a reasonably straight one from the Kutherine River to the South Australian border, and that spur lines should be constructed to develop the country on either side. I structed to develop the country on entire side. Intentioned previously that the proposal that the main trusk line instead of being linked up with Ocdandatta should be linked up with Hergott Springs, is one that should be investigated. have had a survey made, with a view to linking up the north-south line with the cast-west line at a suitable point, instead of taking it south from Odnadatta to Port Augusta. Whether that is a nere desirable proposition than a connevion with Oodnadatta or Hergott Springs, which would necessitate an alteration of the existing gauge on to Port Augusta, is a matter which is receiving consideration at the hands of the Railway Department at the present time. Under existing conditions it is impossible to say which is the better course to adopt. But that phase of the matter is being kept carefully in view in connexion with the determination of the route north,

56 To Mr. Finlayson -The cypress plan to

58. To Mr. Gregory.-In regard to the quantity of powellised timber that would be required to permit of a thorough and effective test being made of it, in proceeding with the line, sleepers of some sort must be provided. Steel sleepers at present are very expensive, and consequently we have to fall back upon timber. In choosing between powellised and unpowellised sleepers tween powernsed and unpowernsed steepers it must be borne in mind that there is a certain quantity of powellised karri on the ground quite sufficient to permit of a thoroughly good equite summent to permit of a moroignly good experiment being made. As to the sleepers re-quired for the balance of the Pine Creek section of the line or of the extension to Bitter Springs it is a delatable question whether we should use powellised or unpowellised sleepers. I was not aware that the Wyndham Creek railway, which passes through badly infested white ant country, has been built wholly of ordinary jarrah sleeperr, and that, although they have been down six or seven years, the manager reports that he has not lost a single sleeper. I think it is a matter for the considera-tion of the Engineer-in-Chief as to whether it is necessary to continue the use of powellised sleepers. In the northern part of Queensland-on the Cooktown line about 70 odd miles of railway have been laid through country which is badly infested with white ants of the worst kind, and yet all unpowellised timber sleeners have been used upon it, and, although some of these sleepers lave been lost owing to the ravages of white ants, their use has been justified so far as the loss from white ants is concerned. It must also be remembered that as the main trunk line comes south will be getting out of the white ant country. Whether it would be wise to powellise timbers

like jarrah or ironbark in preference to karri resolves itself purely into a question of cost. A difference of 1s. per sleeper is equivalent to A dinorence of 18. Per scoper is equations to be 100 per nile on a rallway. If nothing is to be gained by the powellising process, obviously it is hardly worth white paying this additional money. The Engineer-in-Chief will determine or reconstructions of the process of the control of the co mend whether unpowellised sleepers should be used on the main trunk line further south.

## (Taken at Melbourne.) WEDNESDAY, 24rn NOVEMBER, 1915. Present:

Mr. Riley, M.P., Chairman; Mr. Finlayson, Senator Keating, Mr. Gregory, Senatur Story, Mr. Sampson Mr Fenton,

Algernon Combes, sworn and examined. 59. to the Chairman .- I am in no official position at the present time. I was a member of the Royal Commission to inquire into the Northern Territory railways and ports. I arrived in the lerritory in June, and left early in November. I have been along the route of the proposed main have been along the route of the proposed main have from Daly Waters, north to Darwin. I do not consider that the best route, because it is hopelessly poor country. I have been twice over the proposed extension from Katherine River to Bitter Springs, once in July, and again in October. It is very doubtful if the permanent line is to go as proposed, along the telegraph route, whether this extension is essential to the completion whether this oxension is essential to the estipate ing of the riems. It is quito likely that the bet-ter route is over to the west down through the Victoria River country. Of course, I have not seen this country, but I have heard it described in ovidence. I have heard the evidence of station managers and others, who know the Victoria River menagers and others, who know the vectors are country, and they speak highly of it. It is used for cattle, and the southern end will possibly do for shosp—at Wave IIII and around there. The people at Wave IIII would not go to Bitter propile at Wave IIII would not go to Bitter with the cattle of Springs because they would have to cross a wide springs because they would have to cross a wide stretch of waterless country. If Darwin is the part, the cattle would go to Katherine. I do not think that the overesion to Bitter Springs would at all help to develop this part of the country. should say that the route recommended by Messrs. Clarko and Lindsay would be the better one, continuing further south, and tapping the Wave Hill country. For twenty years Mr. Lindsay advocated the other route, but when he came to consider it again, he favoured the deviation to the westward Mr. Lindsay is not in any way interested in land there that I know of If the railway be taken, as suggested by Mr. Lindsay, it would be going away from what is known as a fairly good show for a tin mine. Tin mining is very uncertain. I have been at Marran-The field started in June, 1913, and I was there in October, when it seemed to me to be a very good prospecting show. The deepest shaft was about 40 feet, and I do not know that it is with a such and a no not know that it is not depend on the mining is the most uncertain of all mining. If the field is what it has been said to be, it might be advisable to take the litter Springs route right through it. It is a good thing to open up a country by mining, but, as I say, I know nothing of Marranboy recently; all I can say is that it was a promising show when I was there The establishment of the Governenough pre, but at the time it was proposed I thought it was a mistake—that it would be better to subsidize some of the claim holders, and sink somo shafts. Under the circumstances, I should advocate the other route. I would not go near the mining district unless it turned out something the mining district unless it turned out sometime, very exceptional before the construction started, and that is not likely in this case. I think that the route suggested by Mr. Lindsay is a better paying proposition, because it opens up better country which is there for all time, while the route suggested in the few reasons are the mining might be the few reasons. country which is there for an one, while the mining might last only a few years. In my opinion, Wyndham is the proper port for most of the Victoria River country, and Wyndham is 200 miles nearer than Darwin. There is not much trade at present at Wyndham, and not much has been done in the way of improving the port. There is not a water supply, but there is a good rainfall, and water could be conserved. All that, of course, is a matter of money. I have seen the Admiralty chart, and I think that a good harbor could be made there, there being a tidal rise and fall of 20 feet. As a matter of fact, 4,000 ton steamers go there now, and cattle are shipped The Western Australian Government have been running a steamer of this size, and taking exitie to Fremantic. As I have said, it is the natural outlet for the Victoria River country. I have seen in the press that freezing works have been started, but I understand that they were stopped through some trouble. If freezing works are built there, they will get all the Victoria River cattle except those from, perhaps, within 100 miles of the Katherine. That, of course, would not help Lindsay's route. There would be a certain amount of traffic on that route from Wave Hill, but of trause on that route from Wave Hill, but Wyndham, if opened up, would get most of the trade. In my opinion, the willto ant business is greatly exaggerated. No doubt they are bad, particularly at Darwin, but not so bad as they have been represented. They are not nearly so bad as I have seen in Malaya, where wooden and the seen in the seen in the seen the seen sleepers are used, and I should have no hesitation in using wooden sleepers south of the Katherine. in using wooden sleepers south of the Katherine-Of course, I should use metal sleepers if they were available, but if steel sleepers have gone up in price by 100 per cent., I should have no helf-tation in using wooden sleepers. There are some steel sleepers on this existing line which have been to use for about hundreasure wars and inland sceet sceepers on the existing time which that of in use for about twenty-seven years, and inland they are standing well, but near the coast they are showing the influence of the climate. I did not snowing the innuence of the cimate. I are not see any of the wooden sleepers, though I saw some made of concrete. There has not been much of a test of the concrete sleepers at this place, because they were not put on the main line, but on the wharf line, where the only locomotive was a sort of freak shunting ongine. I know of no poorer country in Australia than that on the telepoorer country in Adartana man man on the tenegraph line route; and that it is poor is proved by the fact that it is nearly all unoccupied. There are no other surveys that would bring this railway through better country; if the railway has the the thing of the railway has the things of the railway has railway through better country; if the railway has to go this way the telegraph route is as good as any other. I know that there is the agreement with South Australia, but the northern part presents such a hopeless proposition that I think the agreement ought to be varied. To carry out the agreement as now suggested would be of no use to Gauth Australia, because that Stets would be of South Australia, because that State would have to pay its share of a heavy loss. Beyond the Macdonnell Ranges, it does not matter, from a South Australian point of view, where the railway goes, so long as it goes to a port that will develop the Territory. A railway from Katherine to Bitter Springs and Anthony Lagoon—about 580 miles

ment battery will be a good thing if there is from Darwin-would strike good country; but then you are only 230 miles from a good harbor at Pellew Islands. The trade, if it goes to Darwin, will be penalized to the extent of all nules, win, with the penantical to the extent of 300 mers, which, at Queensland rates for cattle, represents about 12s. or 15s. per head. That might continue until the country got settled, but there would be agitation for a line to the country of the state of the country of the state of the country got settled. Pellew Islands, and then the other line would be left without traffic. The extension from Katherine River to Bitter Springs is, I think, a useless proposition. I have not seen the west country, but it appears to me to be the better of the two. I have been at Providence Knoll, where there is a small patch of limestone. The country does not improve for at least 40 miles from Katherine. At Bitter Springs there is a big patch of limestone, about 20 square miles or 30. The rest of the country is quartite and sandstone — Cambrian or pre-Cambrian — the postest possible country. Atter Bitter Springs, we have Hodgson Downs and Nutwood Downs, which are what I should call second-class pastoral country; the number of stock shows that pastoral country; the number of stock shows that the country 1, poer. Hedgeon Downs and Liesy Station, about 5,000 square miles, run about 5,000 should be stated by the state of cattle, and this seems right pp to the capacity. Nutwood Downs, near Daly Vaters, is about 800 square miles, and there are 5,000 head of cattle. These cattle, however, run all over the country. He token we also of cattle. These cattle, however, run all over the country. By taking up 800 square miles, the occupior holds all the permanent water, and no one of can take up tand. Baulenia Downs, near McArthur River, has 400 square miles leased, and carries 2,600 had of cattle. The owner teld the Northern Territory Railways and Ports Commission that he reckoned he runs over 4,000 square miles, and that this is necessary. The boundaries are not marked, and there are no fonces. I spent a wock riding up the Roper River Valley to Bitter Springs, and I saw patches of good country, though, on the whole, it is very poor. The valley is from half-a-mile to 5 miles wide, with barren hills on either side. There is no possibility of irrigation or water conservation Botween Bitter Springs and the Katherine there netween inter oprings and the requirements to be no permanent water. The Katherine is a permanent running stream, but it is doubtful whether one could call litter springs permanent water. The permanent springs are almost unit. for use, and the water-hole above is only enough for a head station The water in the Roper gets better 25 miles down, where it is just about drinkable. Twelve miles south of Bitter Springs you might call it permanent water at the abandoned might call it permanent water at the abandoned station of Eleoy. Beyond that in about 100 miles there are four wells, but when I was there three were dry, and we had to stay two days to water forty horses. There is no pessibility whatever of minerals south of Marranboy until you get to Davenport and Murchison Ranges. According to Dr. Jensen, it is proved that there is sub-artesian water. There are seventy bores on the Barkly Tablelands, and they have never failed to strike water at 200 feet to 300 feet. The water varies in quality, and most of it might be classed as good stock water. I take it that the Northern Terristock water. I take it this one retrieved tory is purely a pastoral proposition for possibly the next generation. There have been experiments with agriculture for thirty years, I suppose, ments with agriculture for thirty years, I suppose, without success, and much money has been spent in this way. Most of the things that have been tried would doubtless grow, but commercial success is another matter. Of course, I am now speaking of the northern part of the Territory. I think there is a possibility of sheep being successful, and much evidence was given before the

Royal Commission on this point, showing that sheep would do on the Barkly Tablelands, and at the head of the Victoria River, though it is doubtral whether this could be said of country further north. When I was there sheds and so forth were being put up at the Government sheep farms at natter Springs, but the sheep had not arrived. I do not see much prospect for sheep doing well there. The Government may be able to keep sheep alive, but, as I say, commercial success is unother matter. Dingoes are very plentiful on the Roper. The spear grass in this part of the Territory is very bad for sheep, and soventies, sheep were tried on the Katherine.

About 12,000 were sent from South Australia, along with 2,000 head of cattle, to a station formed near where the proposed railway is to cross the Katherine. After three or four years, how-over, the venture was abandoned, the animals mostly dying or disappearing. It is evident that the people who carried out the experiment knew some-thing about sheep, because, although it was a t. . year, none were lost on the road from Adelaide Dr. Brown, of Adelaide, is supposed to have lost about £40,000 in this experiment. Sheep have been tried about 70 miles from Darwin by the present Administration, but I do not think that present Administration, but I do not think that any are alive now. South of the head of Victoria River, Nowcastlo Waters, and Anthony Lageon, there is every possibility of sleep deling well. A-cording to the evidence we heard, Aven Downs Station has been a sheep station for about thirty years. According to the estimate of the owners, Barkly Tablelands can carry about 2,000,000 sheep and 600,000 or 700,000 cattle on 20,000,000 acres-1 sheep to 5 acres. The highest estimate we acres—1 sheep to b acres. The inguest casimate we got was 150 to the square mile. There is spinnifex south of Barkly Tablelands. Cotton grows wild in the north at Port Ecsington, but whether it could be made commercially successful, I am doubtful. Experiments in this regard have been made at several places in the Terriory, and sugar has also been tried. In the eighties, about £20,000 was spent on sugar near Darwin, but when they got 7 tons the first year, and 5 tons the next they gave it up. Coccanute will grow, but I hear that they do not ripen properly. Collee has been tried, and I think the reason for its nonsuccess is the six months drought every year. I lived on the Malay Peninsula for five years, and I know what a tropical country is. Rice has been grown in the Northern Territory to some extent; at one time about 3,000 Chinamen were there, and as all Chineso understand rico growing it is likely that it was given a fair trial, but they did very little good, and gave up the business. saw an attempt near Pine Creek when I was there, but I do not think the soil is suitable, or that the minfall tends to success. My experience of the Northern Territory does not present a very bright outlook from an agricultural point of view, and I do not think that that view is worth worrying about. On a small scale there may be agriculture, but I regard the Northern Territory as a pastoral, and, possibly, a mining proposition. I was all over the mining fields at Pine Creek, but everything seems to be going back There is one good copper show, I believe, about 40 miles east of Pine Creek. There is cerfainly a good show of copper ore, but there are many difficulties. Nothing can be done without a railway, which would cost £250,000, and there is no wood, not even firewood for mining purposes. There is no flux, and all the ore would have to be taken to the seahoard.

60. To Mr. Sammon .- My idea is that the Territory should be developed from the coast line by port. I have aiready said that I regard the proposal before us as so hopeless that the agreement ought to be varied. There are only two routes, one by Bitter Springs, and the other down to the west, and I assume they would connect somewhere south of Newcastle Waters. I would carry the line more directly south than Mesers. Clarke and Lindsay's route, say to Wave Hill head station, and connect somewhere about Renner Springs. or further south. If the line I have speken of were built, Darwin would get the traffic in the absence of a line to Wyndham, and that, in my opinion, would be in accordance with any scheme of development from the coast line inward. If a line were not built to Wyndham. it only means that the export of sheep and cattle from Wave Hill would be handicapped by 200 miles extra haulage to Darwin. If the route I suggest were taken, it would serve most of the Victoria River country, but it would not avoid a railway to Wyndham when the country became rativay to Wyndiam when the country became more settled. As a pasteral proposition the line would serve fairly well. The deviation of the line to Marrandoy all depends upon the prospects of the field. The Victoria River country will justify a railway sooner or later on its merits. I should prefer the western line with a branch. The construction of a main line on the best route, and with a view to its being a commercial undertaking, is a matter of course that involves much investigation. It depends on the traffic to Marranboy, and the possibilities of traffic south of the junction. Then we have to consider the relative cost of the different routes, what the grades will be, and the possible traffic from the Victoria River country. My impression now is that the western line is the best.

61. To Senator Keating .- Throughout the Territory, where there are creeks, there is a possibility of conserving water; but when I was speaking a little time ago of the Roper River, I had irrigation in my mind. There we have presented op-portunities for the construction of dams for the conservation of water for stock and domestic purposes. On the McArinur River, near Borrolcola, poses. On the alcarrant river, near horrowood, there might be facilities for the conservation of water for irrigation purposes. That is the only place I saw in the Territory where there is a large area of fairly level country suitable for irrigation. I had about ton years' experience of water supply and irrigation work in Victoria and New South Wales, and I think the country about the place I have mentioned would be good for agricultural experiment. It appears to be fairly good soil. There is a lot of limestone country on the McArthur River; it makes the fortile flats lower down. Owing to the presence of tile flats lower down. Owing to the presence of the limestone this country is better than any I saw olsowhere. It is very hard to say what the soil there is capable of producing, but I think, for one thing, lucerne would grow. There are a few patches of it round about Borroloola, and it seems to do very well. The line I suggest would go through the country I have just mentioned, but that was too small a consideration to influence me in my proference for this route. There is a pretty fair area of this land, perhaps 40 or 50 square miles, but, apart from that consideration, the route I favour is the shortest from good country to the sea-board. There are patches of country else-where in the Territory where conservation and irrigation might be carried on. For instance, there might be some land on the Roper on to

which water could be pumped from a water-hole, but these are only isolated instances. I think the agreement should be varied so that the railway route should be from Oodnadatta to Alice Springs, and the Macdonnell Ranges going north; then south from Pellew Islands to Anthony Lagoon, Alroy Dawns, and the Frew River. 1 am doubtful about the Frew River, because, according to Mr. Gordon, of South Australia, it is pretty rough country. If the route I have mentioned should prove impracticable, the alternative route from Anthony Lagoon to Tennant's Creek, and thence along the overland telegraph line could be adopted. The line from Port Augusta to Police Islands is 250 miles shorter than from Port Augusta to Darwin, and 250 miles in a long haul like this is a big thing. I do not consider that the agreement should be varied to the extent of not connecting Oodnadatta right through the Northern Territory to the sea, but I think that the line should go from Oodnadatta to the Pellew Islands, on the Gulf. I do not think that Darwin has any more strategic value as a port than Pellow Islands or Wyndham; an enemy might land at any one of the three places, and even at Port Essington, for that matter, which is about 200 miles from Darwin, and has a better harbor. Admiral Creswell gave evidence be-fore the Commission, and laid stress on the com-parative importance of Darwin as a mayal station. As a strategic point for Australia in relation to the waterway between the Archipplage and the Pacific, Admiral Creswell considered Darwin most important; but, on the other hand, General Gordon, who was then Chief of Staff, refused to name any point. Admiral Creswell stressed the fact that from Darwin it would be more easy for Australia to harass a hostile fleet passing from Europe to the Pacific than it would be from any other point. I regard Darwin and Essington as practically of equal value from this point of view. If all the railways that have been mentioned are built, the question of fuel becomes a big one. I think that coal at Darwin now is about £2 10s. a ton, and the working expenses of the Darwin line are 8s, to 10s, per train mile, as against about 3s, 8d, in Queensland. According to a geological report, there is coal in western Queensland, south of the Gulf, for hundreds of Queensiand, south of the Guif, for hundreds of miles, and this might be developed and made use of. I do not think, however, that any steps have been taken to develop this deposit. I have not seen any of the coal, and I do not know its value. According to Dr. Jensen, there is no oil or coal necessary to the sense of the s be constructed from the nearest ports to the hinterland. The exports will be cattle, wool, nanteriand. The exports will be cattle, wool, and sleep, and these require to reach the nearest possible ports. I do not entertain any very high hope of tropical production in the Territory, and I think that the non-success in this regard is due to the rainfall—six months doluge and six months drought. In the real tropics the rainfall is the same all the year round. I have had experience of railway construction in the Malay Peninsula and Siam for five years. My work was that of deciding when, where, and how to build railways. The conditions in the peninsula and Java are not any-thing like those of the Northern Territory. Nominally, the Northern Territory is in the tropics, but actually it does not appear to be so, for the vegetation is altogether different, and the land so much poorer with the six months' drought.

In the real tropics the rainfall is very evenly distributed throughout the year; there is no winter and no summer—no season. The Northern Torritory is a tremendous proposition; though apart ntory is a tremenous proposition; enough apara from that the railway question appears to me simple enough. It is a cattle and sheep propo-sition. The chiof things wanted are water con-servation and bores, with the opening up of stock routes. I know that for the last twenty or twentyfive years there has been great railway construction development in Africa-in the Sahara and other places which, some years ago, were regarded as absolutely unproductive. I have not, however, gone into the question more than reading about it in the technical journals. I do not see how any information in regard to this water development elsewhere could help us so far as our railways are concerned. Information of the kind might, however, guide us in making better use

of the coastal country.

62. To Mr. Gregory.—I should say that the construction of the proposed strategic railways of south-eastern Australia is of more importance at the present time than Territory railways. The pastoral development of the country will, I think, come from western Queensland and western New South Wales. The railway which would give the greatest return would be one from Pellew Islands to the Barkly Tablelands. Then there should be a railway from Wyndham into the Victoria River country, and one from Oodnadatta to the Macdonnell Ranges. It would pay people to trans-port cattle at Queensland rates 500 or 700 miles to a port, but it might not pay at Northern Territory rates. I should say the cattle trade could stand that. Of course, it is a matter of the class of railways. The present line from Darwin to Pine Creek is not capable of carrying any really heavy traffic; it is not strong enough, but needs to be rebuilt at a cost of £400,000 or but needs to be routine as a cost of exception of £500,000, with heavier rails and strengthened bridges. Until that is done the line cannot carry proper train loads. I do not think that 41-lb, rails are heavy enough; there ought to be 60-lb to 70-lb, rails. I have heard that in Western Australia new areas have been opened up by rail-ways with 41-lb. rails, on which heavy loads are carried on easy grades. The grade is 1 in 60 be-tween Darwin and Pino Creek. It all depends, however, on the amount and nature of the traffic. and cattle is a difficult traffic to handle in the Northern Territory. It lasts for only five or six months in the year, and the question is what to do with the men afterwards. In a State like Queensland, with a big railway system, the men could be transferred from one place to another, but in the Northern Territory it appears to me that they would have to sit down and wait for the that they would have to sit allow and wast for the next season. As to light railways for opening up a country. I would point out that at Darwin and Pine Creek we have a region of very heavy rainfall, even at Bitter Springs it is about 35 inches. The saving in the first cost between the heavier and the lighter rails is not very much, and I do not think that we could build railways for £3,500 per mile with the present price of labour in the north. South of the Katherine River you will get grades of 1 in 100. The freezing works established by the Western Australian ing worss established by the vestern Australian Government at Wyndham will undoubtedly get most of the cattle. At one time, the great idea was to drove cattle, but railing is coming more and more into favour. Droving: is done on a big scale very cheaply, from 1s. to 1s. 6d. per head per 100 miles. Cattle on the define farm Matchine. 100 miles. Cattle can be driven from McArthur River to Bourke, 1,400 miles, for £1 a head. I have never gone into the question of utilizing

F.16003.---

the tides in the north-west in the generation of electricity for power purposes. I believe that some one now is experimenting with the generating of electrical power by means of the sun's rays ing of electrical power by theans of end and any and the Macdonnell Ranges. I did not see any mining timber in the locality of Marranboy. Along the rivers, and in the water-holes, there is Along the rivers, and in the water-inces, there is what is called paper-hard, which I take to be a species of ti-tree, 2 or 3 feet in diameter, which might be useful. It appears to be sound, but the great percentage of the timber in the Territory is useless, stunded stuff, and nearly all hollow, not fit even for good firewood. As the tin-mining field is developed, and they get deeper down, the expenses will increase, and water will become a very heavy consideration.

63. To Senator Story .- I prefer the deviation to the west in order to touch the Victoria Downs country. As a strategic railway, it is necessary country. As a strategic rainway, it is necessary to have a line north to a certain point, say, Newcastle Waters, Pellew Islands, Wyndham, or Darwin; possibly it would be advisable to have a railway to three places. I do not think it is correct that, with a line from Darwin to Port Augusta, the trip to England could be shortened very considerably. I think it is practically the same distance from Colombo to Darwin as to Fremantle. tanco from Colombo to Darwin as to Reconsider.
If the idea was to go overland through India or
Russia, the people would not go to Darwin, but
Queensland. I have not been in the Macdonnell Range country, but from evidence given to the Commission, there seems to be considerable mining and pastoral possibilities there. A railway for 300 miles from Oodnadatta to the Macdonnell Ranges would probably cost £2,000,000, and it would be run at a loss, though it would be justifiable. It would open up a lot of country, and there is no question as to the route; Port Augusta is the natural outlet for all that part of Central Australia. Sconer or later a railway will have to be built southward to the South Australian border, but when I reported, I was not looking very far ahead. The building of a line from the Macdonnell Ranges would take four or five years, and to fill up the gap would take about the same time. The only justification for taking the line to Bitter Springs is, in my opinion, that it would develop the Marranboy tin-field. The country traversed is of the poorest possible kind, and not capable of development. The evidence of oxperienced pastoralists shows that the best of the country would not carry more than four head of cattle to the square mile. The labour of the 150 men or so who might be thrown out of employment if the proposed railway is not proceeded with ment it the proposed railway is not proceeded whim might be utilized on the Marranboy tin-fields, if they were miners, but I think there is plenty of other work for them in the way of making reads and tracks, and works for water conservation. In Darwin, there is an L-shape pier capable of handling about 20 tons an hour, and what is required is a new causeway on which the trains can be run alongside the ships. This work would cost probably £80,000 or £100,000. I have heard it said that people are likely to settle about Bitter Springs, but in the last two or three years the Administration has surveyed and thrown open 200,000 or 300,000 acres for agricultural settlement, and there are only ten settlers. Why not put the men there? It is only 70 miles or so from Darwin, while Bitter Springs is 265 miles away from the sea-board. The land subdivided is quite as good, and, possibly, better than at Bitter Springs. I certainly do not think there is any necessity to build a railway which would be a losing proposition simply for the sake of keep-

ing 150 men at work; there is plenty of work to be found for them. Some day it would be a good thing to have a line from Darwin to junction with the McArthur River railway for strategic purposes, but that is a long way ahead. If we spend money in that way now, there will be no money to build lines really required for settlement purposes. It is possible, of course, that in the present unsettled state of the world a strategic railway may be needed within, ray, the next eight or ten years. Assuming that there are freezing works at Wyndham, there is evidence that there is a good, well-watered stock route to that place from Victoria Downs, and it is quite likely that, in view of the extra distance and freight to Darwin, such a stock route would be used. The same thing, however, would follow if you put the freezing works at Pollew Islands. The difference in the distance to the sea-board is oven greater. If the line were continued along the telegraph line, and a spur made to the Victoria Downs country, it would add considerably to the distance; so much so that it would probably kill the traffic to Darwin, and send it to Wyndham. As a railway would go, the Wave Hill country is almost as near Port McArthur as it is to Wyndham. I propose a line right across cast to west joining the two. Pellew Island would very likely get the traffic, even if a railway were built to Wyndham. The distance from Wave Hill to Pellew Islands The distance from Wave Hill to Fellow Islands and to Darwin is practicelly the same. The plan propared by H. Y. L. Brown shows the possibility of coal in the Territory. Bores were put down in Anson Bay two or three years ago, but nothing was found. The lend spoken of by Brown towards the Barkly Tabblends has not been bered, but it has been examined by Javane. but it has been examined by Jensen. I am pessimistic about the prospects of tropical agriculture in the north, but I should think that tobacco is the thing that would grow there. For some reason or other the growth of tobacco seems to have been a failure in spite of the favorable climate. I do not know any of the particulars of the reasons why tobacco culture was abandoned in the Northern Territory, but I still think there are possibilities. For thirty years or more experiments of all kinds have been tried, but none successfully. There is no doubt that maize would grow there in

64. To Mr. Fenton .- If the trade were good enough, steamers would go to Pellew Islands. oliologia scenaria wound go to rensw asanats. Idi do no taxamine that port as much as I should have liked, but Mr. Jenson spent a fortnigue there, and is as well qualified to express a judgment as I am, and he considers that it would carry a railway. There would be no great length of piering required. The chief difficulty is taking the railway out to the islands, and bridging the arms of the sea. Where it is proposed to make a harbor there is a depth of 24 feet at low tide within 100 feet of the shore. Pellow Islands would make quite as good a harbor as would Darwould make quite as good a narior as would Darwin. The latter has had about £80,000 or £100,000 spens on it, and probably requires another similar expenditure; and if the money were spont on Pellew Islands, we should have a harbor spont of letter Mannes, we should have a horsor there would not only serve the Barkly Tablelands, but also the Normanton district, in Queensland. I do not know the Queensland port, but we had ovidence that it is hopeless to get a good harbor on the Queensland side. My contention is that the through route I propose will save 250 miles of haulage from sea to sea, and this, taking the cost of the line at £6,000 per mile, would mean

a saving of £1,600,000. I should say that thern Territory from June to November, 1913, Wyndham is about 200 miles from the western and my knowledge of the country a confined to border of the Territory at Turkey Creek. As to whether, before Wyndham becomes a port for the Victoria River country, it would be necessary to have a line of railway from Wyndham to the border, I should say that Wyndham would stal be likely to get the trade without a railway. This would depend on all sorts of things-markets, seazons, and so forth. The evidence is that there is a good stock route right through at every season of the year. I had out about 400 overy season of the year. I take our about 410 miles of railway in the Malay Peninsula which would form part of the scheme of an overland route to Great Britain. I think it will be a long time before that comes to pass. Such a railway would greatly reduce the mai times, but a lot of railways will have to be built before that is an accomplished fact. I understand that Vestey Brothers have a chain of country from the head of the Victoria River to near the Katherine, and I should say they are bound to send their stock that way. If they sent it to Bitter Springs they would have to cross a patch of absolutely waterless country. The deviation proposed by valoriess county. In deviation proposed by Clarko and Lindsay would take the line away from the Marranboy tin-fields. I think that oil might be used successfully as fuel in the Northern night be used successfully as fuel in the Northern Teartiory, but that is a large question. Darwin and the northern part of Australia is very well situated so far as the supply of oil is concerned, because there is Bornee, and possibly New Guinea to draw on, and, in time, oil may be used in preference to coal. If oil could be obtained in large quantities, it would be a better propestion than taking coal from the south. My Commission was recalled before it had finished its investigations, and it will be seen from my report. that I do not recanied octors it had initialed its investigations, and it will be seen from my report, that I do not recommend a railway straight out for the reason that I have not seen sufficient of the country. The Commission was appointed for two years, but with the change of Government, it ended in third an unput it. Had I had neather it ended in third an unput it. teen months. Had I had another nine months, I should have seen the southern part of the Macdonnell Ranges country, and also the Victoria River country. As I have said before, I regard the proposed extension from Katherine to Bitter

Springs as a hopoless proposition.
65. To Mr. Finlayson.—By profession, I am a civil engineer. I am a native of Tasmania, and at sixteen years of age I joined my father, who was a civil engineer in the Wimmera. I was three years with my father on water supply and irrigation work. I was then some seven years in New South Wales, engaged in water supply and New South Wates, engaged in water supply and mining works, including copper smolting. In 1898 I joined the Victorian Railways, and for four years was engaged in all sorts of railway work. In 1992 I was appointed by the Colonial Office as Chief Surveyor of the Malay States railways. ways, this included part of Siam. I was there ways, this included part of Siam. I was there four and a half years, and on my return to Victoria was appointed superintending surveyor in charge of railway surveys in Victoria. This meant investigating and reporting on all railway propositions, making surveys, and so on. In 1913, nearly sown years afterwards. I resigned that position to join the Northern Territory Commission; my last official work was reporting on the proposed strategic railways of south-eastern Australia. Apart from the Northern Territory schemes, I have, in the last fifteen years, investigated and reported on about £25,000,000 worth of proposed railways, and have designed and made surveys for about 1,000 miles of railways, costing E5,000,000 or £6,000,000. I am now occasionally engaged in private practice. I was in the Nor-

ago I was in Darwin. I have, however, supplemented my experience by a careful study of the mented my experience by a careful actuy of the question, and have examined witnesses from all over the Territory, so that I think I have now a fairly good general knowledge of its requirements. There is no practical need for the building of a There is no practical need for the building of a north-sout railway as a commercial enterprise, though it night be justified for atrategic purposes. Commercially, the line would fail for want of traffic, but on this point it would be better to take the railway in sections. For 300 miles from Oodnedatts to Macdonnell Ranges, there are possibilities, and the line might, in the future, pay working expenses. The not 300 miles to Tennant's Creek is very poor, excepting in patches, as I understand from reading the evidence. The following 400 miles to Pino Creek is also wretched country. Unless for strategio puralso wretched country. Unices for strategic pur-poses, I would suggest a go-easy policy for railway construction through the centre of Australia. I bellove in a line to Macdonnoll Ranges, a line to Pollew Islands, and from Authony Legoon to Camcoweal. If it is decided to follow the telegraph line, then the line from Katherine to Bitter graph line, then the line from Katherine to little-prings is a section. If the Marranboy tin-field is sufficiently good, it is probable that the line should be taken across three misted of missing the field by 12 miles. The only immediate justifica-tion for a proposed extension is as a link in the morth-south railway. The country proposed to be traversed has been known ever since 1872, and it is all'll ungeounded. At one time Bittle Springe. is still unoccupied. At one time, Bitter Springs formed part of the Elsey cattle station, but it was abandoned. Presuming that the section between Katherine River and Bitter Springs is determined on, I do not think that a branch line between Katherine River and Pine Creek would be proferable to a line to Wyndham, which I regard as the natural outlet for most of the Victoria River coun try. The northern portion would be better served by Darwin, because of the distance only. I would favour some arrangement with the Western Aus tralian Government to connect up the Victoria River district with Wyndham, because to develop that part of the Northern Territory is the proper

66. To Mr. Sampson .- I do not know the Daly River, but I know the Katherine, and I have been at the Alligator and the Roper I think that the soil in the lower reaches of the northern river system is quite unsuitable for irrigation; it is too stiff. In the Malay and for irrigation; it is too still. In the mining Peninsula, there is practically nothing elso but rice-growing and tin-mining. I should say that 90 per cent, of the rice there is grown in swamps in fairly stiff soil, between the hills. North of the Katherine there are a few square miles of nice-looking limestone country, which might be irrigated by pumping water out of the river. No doubt a great amount of water could be conserved on the Katherine, if required, but I know of no on the Antherine, if required, but I know of no large area to justify the building of great reservoirs, and so forth. I am very doubtful if the dairying industry could be carried on in any of the coastal country, because, with insect and other pests, the cattle do not do well. The first in the way season are companied for the coastal country. wet season are something frightful. The cattle there seem to live, but I am doubtful whether dairying would succeed. Amongst the other products grown in the Malay Peninsula is rubber, which, I think, in some respects, so far as the which, I think, in some respects, so far us the climate and soil are concerned, might be produced in the Northern Territory. How-ever, as I have said before, the trouble

is the six months' drought. I do not think so that cattle reduce very rapidly. A railway that the prospects in regard to irrigation would assist very much indeed in that direction. that the prospects in regard to irrigation colonies are too bright. The only place I thought worth trying was, possibly, on the McArthur River, where the soil is better, because it comes River, where the soil is botter, because it comes from limestone country higher up. There are also good sites for dams and storage. Along the Adeleids River, there are fairly extensive flate, which are periodically inundated, and ought to be suitable for rice culture. I have hear a good deal should it. I think there might be settlement on a lot of these rivers, but that, of course, means a small-standard reproduction and not one of roil. a small-steamer proposition, and not one of rail-ways. I see no chance of closer settlement in the country where there is six months' drought every year. Irrigation is an expensive business, with many drawbacks, and I do not think we need many drawbacks, and I do not think we need worry about it for a time. A comprehensive report on the subject might be useful, but I do not think the prospects warrant it. I have heard no areas sufficiently large to instify such a policy River valleys like the Alligator, the appearance of the property o

#### (Taken at Adelaide.)

WEDNESDAY, 2ND FEBRUARY, 1016.

Present:

Mr. Riley. Chairman: Senator Keating Mr. Gregory Mr. Sampson Mr. Laird Smith. Senator Story Mr. Fenton Mr. Finlayson

The Hon. John Lowis, M.L.C., Director, Bagot, Shakes, and Lowis Ltd., King William street, Adelaide, sworn and examined.

67. To the Chairman .- I have a good knowledge of the Northern Territory. I went over-land from Adelaide in 1871, right through to Port Darwin, and, in 1873, through there to Port Essington; so that I have gone across the continent of Australia from one side to the other. I have been over that part of the country involved in the extension of the railway now being considered from Kathorine to Bitter Springs. There is no doubt that the railway will have to go very near to Bitter Springs if the intention is to take it through from Katherine to Oodnath. datta. The country to the west of the track would probably be drier, and not subject to the inundation that occurs from Katherine to Bitter Springs, where you get into low-lying land. It is one of the sources of the Roper River. I should like to explain that I am interested in pastoral country in the Northern Territory, and also in South Australia, along the proposed railway from Oodundatta to Pine Creek; but I wish the Committee to understand that I am not advocating anything for my own special benefit. My evidence is for the benefit of the whole community. A railway along the proposed route munity. A railway along the proposed round would undoubtedly assist in the sending of cattle for treatment at Darwin. The travelling of fat, great stock down to Pine Creek would reduce their condition very considerably, because cattle in that country are not like those farther south. They do not thrive on the feed as they go north. The feed is very long and rank, and not succulent,

Pastoralists would undoubtedly avail themselves Pastoraists would unususculy avail inconserved of a railway—I refer to a railway from Bitter Springs north to Darwin. A railway is already sanctioned from Pine Oreck to Katherine, and the continuation to Bitter Springs would be a very great convenience. The extensive freezing works which have been erected would be able to trent all the cattle that we pasteralists would be able to send from the neighbourhood. It is not sheep country, but cattle and horse country, and much better for cattle than for horses. The alternative route is a safer route, because there would not be so much inundation. The blue-grass swamp country is very much subject to in-undation in wet weather. The alternative route would be a little longer, but a little cheaper—I am referring to the western side. The western deviation is down the Wave Hill district. I would advocate the straight line down to Oodnadatta, though it would be a little way out of a straight line. From what I remember of the country, it would be much easier to take the western line. There would probably be 25 miles diforn inc. There would probably be 25 miles dif-ference between the two lines. The western deviation would just escape Newcastle Waters, and go west of Lake Woods, which, when full, is 160 miles round. I think it would be a great many years before the line would be a paying proposi-tion; but it would help materially in opening the country on either side. The only rich tin-field is below Kotkbeine, but the below Katherine; but that is quite a recent disovery, and I could not express an opinion about it. A roport made about twelve years ago said there was tin there, but the question was whether it could be worked at a profit. Efforts have been made to raise sheep there with very unsatisfactory results. I brought 10,000 from Avon Downs, and took them round to Newcastlo Waters. The grass, however, was very rank, and did not do for them at all, and some of them got cancer. There is a great deal of country on either side of the line that might be taken up if there were greater facilitics for communication. The cost of rations is very great indeed; it cost me £45 a ton to get supplies there. I do not think there is anything more I could add, beyond a belief that if there was a railway a great many stations would be formed on either side of the line, so the people could get better provisions and material. This, count got better provisions and material. The, of course, would help to develop the country. We had to send our loading 850 miles by camels; so that you may understand the cost. Barkly Tableland is much better. I have not been on it, but I understand that you can get water at about 350 to 400 feet. That is right across what is known as Barkly Tableland, which is very good country indeed. The extension of the railway will, to a certain extent, go towards Barkly Tableland; but the people there could get to Burketown ensier than to Darwin. Their stock nearly all goes into Queensland.

63. To Senator Story .- In my opinion, the Bitter Springs route is the better, though more difficult to construct. A short line to Port McArthur would help the Barkly Tabloland very much indeed; but I should have thought it better for the people there to send to Burketown. A shorter distance to the seaboard would, of course, save a great deal in carriage, and the Barkly Since a great use in carriage, and the Baray Tableland is the best country we have. The castern route, following the telegraph line, is the better. It follows John McDouali Stuart's route,

and he discovered nearly all permanent waters, country, with one small exception. In order to and to discovered nearly all permanent waters. You could easily go right on to the MacDonnell ranges from Oddandatta. The country in between is so inferior that it is searcely worth considering a railway, unless you go right on to the ranges. There we have a good rainfall of 12 inches; it increases from 4 inches as you near the ranges. The rainfull in between is too poor to warrant a railway, unless the railway goes right on. At Charlotte the rain-fall is only 4½ inches a year; but as you go north-you got a good rainfall, as at Allee Springs. There is a patch of sandy desort country which is Anere is a paren of sandy desert country which is marked as an artesian basin. There is no telling, however, how far it goes. The only proof is a hore about 12 miles from the South Australian hore about 12 mites from the South Australian border. I should go right through the country with a railway if I wanted to make a success, starting from either end. I would not spend one penny in the Northern Torritory unless I could get coloured labour, which, I am sure, could work the Northern Territory profitably. I had six years of hard work there; but if a man has a defect in his constitution, and gets a fover, he has to clear out, or he very soon dies. You can-not get a European to work there like a coloured

69. To the Chairman,-The Chinaman is as good a man as we can get for mining work there. We had white men from Ballarat for the gold mines, at £4 10s, and found, but they did not stay long before they cleared out. We got a num-

ber of Chinamen from Singapore. 70. To Senator Story .- I suppose that there is no possibility of that kind of labour coming now; but I think that the Territory is hopeless without coloured labour. I am sorry to say this, because I would sooner have white labour. There are a few aboriginals there, but they are getting fewer now nouriginals there, but they are getting fower every day. They are not good for manual labour; but south of that part they are only good for stock work, which, of course, is all you need for stations. South of that, however, you want to cultivate land as well as raise stock. So far as I know, there are not many minerals south of the Katherine, except at Macdonnell Ranges. There have only been a few specks of gold discovered between the Kathorine and the MacDonnell Ranges, but there are gold and precious stones, with wolfram and mica. I recommend that it would be better to follow the

suggested route on to Bitter Springs.
71. To Mr. Finlayson.—I know the Victoria 71. To Mr. Fintayson.—I know the Victoria River district by repute. It is excellent country, and a great deal might be utilized if there was water for irrigation in the future. It is rich, dark alluvial soil; but, of course, I speak only from hearay. I think the country would be better served by connexion with Wyndiann. The district covered by the western scheme is, so far district covered by the western scheme is, so an as I know, poor, dry country, until you pass the waters. It is from the Katherine River crossing that the divergence of route occurs. I do not think that the extension of the line from Katherine River to Bitter Springs would in any way prejudice the north-south route. The more easterly route that I suggest would, I think, traverse better country and give a better return. There is some good country on the other side of the Roper, to the north of Bitter Springs. The railway to Bitter Springs would tap some good country. The extension to Katherine River is, I collitry. The extension to framework at the continued to Bitter Springs. There is a strip of bad am glad to hear that on the railway construction

make the extension worth while, it ought to go on to Oodnadatta. A line built out in a westerly direction would have to depend entirely on pastoral occupation. If the line be continued to Bitter occupation. If the line be continued to Bitter Springs, I think the pastoralists will make use of it for transporting cattle. As I say, the line would have to depend on the pastoral traffic. A good neary people from Barkly Tableland would use the line. The country there is very fairly stocked with both sheep and cattle, and there would be more traffic as the line was extended. southwards to Newcastle Waters. If the line is to be constructed at all, it is better to go from Katherino River to Bitter Springs.

72. To Mr. Laird Smith.—It would, in my opinion, be profitable to send sheep from the Batkly Tableland to the freezing works in the north if the line were constructed. The Bitter Springs country is subject to inundation, but higher up there are only one or two creeks to cross; after that you are practically free from flood country. With freezing works in Darwin, it would be advisable to continue the line from the north for the development of the Territory. As to the rainfall in the Macdonnell Ranges, the Northern Territory is partly tropical and partly sub-tropical; but the rains, as a rule, occur from November to March. I think that this railway will assist very greatly in the defence of Australia. I have never suggested the abandonment of the Territory, but I would not like to take it on unless I could use coloured labour. I am not aware that in South Africa coloured men objected to go that in South Arrica coloured mon objected to go below a certain depth. As to the Chineso labour having "picked the eyes" out of the mines, I do not think, as an old miner, that they are very nucle different from Europeans in that respect. Wherever there was a good patch, I tried to get it, and the Chinamen would do the same. When the railway was first constructed there, Mr. Charles Miller told me that he could never have carried out the work without Chinese labourhe could not get Europeans to do it. That was not owing to the isolation of the country, but because the climate is against Europeans working there. I am not versed in what has been done at the Panama Canal in the way of enabling white at the Panema Chanal in the way of enabling white labour to be utilized, except from what I have seen in the papers. It is not a matter of wages, because, as I have already said, we paid £4 10s. and keep, but the white men would not work there, simply because the climate was against them. Stock-men have a different life from that of the miner; it is not such a task to ride a horse as to use the pick and slovel. Then, further, the stock-men do not ride much in the heat of the day, but in the early morning, or the cool of the evening. Apart from the coloured labour question, I would, as a matter of development in the Territory, suggest a railway policy similar to that now under consideration-I would follow the telegraph line right through.

73. To Mr. Fenton .- It is nearly forty years since I was in the Territory. I know that considerable alterations have been made in regard to the employment of labour in tropical countries. A Britisher in India manages very much better A Britisher in Italia manages very much better than he did forty years ago; but there all the work and personal services are done by the natives. There are, of course, exceptions to every rule, and a man might work in the Northern

at the present time there are 200 white men engaged, and that the medical testimony as to their health is exceptionally good. I suggest, however, that if there have been 200 men engaged there that it there have been 200 men engaged there for eighteen months or two years, they may not have been the same men all the time. A good strong Britisher is a valuable man, if he takes care of himself. The Victoria district may be all right, but past that is some of the worst country we have. It is dense scrub country, which no one has thought to take up. I speak of westward of Newcastle Waters, where the country is all wretched. By taking the westerly route, you miss all the country round about Bitter Springs, where the land is very decent indeed. On the eastern side of the telegraph line is better country. I reekon a better class of country would be served by the more easterly route. To make Port Me-Arthur the port would be "robbing Peter to pay Paul." It would be of some advantage, but freezing works would have to be established, while there are already freezing works arranged for at Darwin. From my knowledge of the country, and speaking generally, I regard the route I have suggested as the better one, and I differ from the report of the Royal Commission. Having regard to the development of the Territory as a whole, I believe it would be better to construct a railway from north to south, as well as from south to north simultaneously.

74. To Mr. Sampson .- I do not know if the Burketown meat preserving works have gone in for freezing; a fair number of cattle are received there. But, of course, the large companies have gone inland. I do not know the country of the westerly swing at all. The southern portion of the deviation on the western side is poor country, and it is poor country as it tapers back to the telegraph line. The southern portion of the eastern deviation, as it is coming back, is much better, because there is water there. I should say, however, that it is not good pastoral country, because it is too dry. All the country east of the telegraph line is taken up, but that is not so on the west. The country on the eastern side is all good grazing country. My stations there run from Newcastle Waters up towards Daly Waters, and below Powell's Creek-about 6,000 square miles.

75. To Mr. Gregory.-I said a little while ago that in the southern part there was a large area which was supposed to be artesian bearing, and which was supposed to be dressed containing, and I presume that, to a great extent, there has been a systematic survey of the artesian belt; if not, it is only supposition. The only man who explored the fringe of the country is Cantain Barclay, and the only bore is about 12 siles over the border from South Australia. This country carries a good many stock in the dry season. There has been no trial north of that. I think it would be a great advantage to have the whole of the artesian area geologically mapped out. The basin seems to run between the Australian Bight and the Gulf of Carpentaria.

I have slaways advocated that there should be a I have always advocated that there should be a special offert to locate the water supply. It all depends on circumstances, as to what railway distance cattle can be profitably freighted—what the cattle are worth, and what the freights are. From Oodnadatta it costs 30s, per head to get the cattle down to Adelaide. We could pay the same rate north to the freezing works, which would pay us very well at the present prices. We could

fatten stock for the freezing works, and I should be very glad to pay 30s, per head. I should not like to express an opinion as to whether, with cattle raising, the railway could be made to pay. A railway would assist very materially in develop-ing the country, but I could not say whether that development would be sufficient to make the railway pay. As to mining development, it all depends upon the magnitude of the minerals. If you have anything like a Kalgoorlie or a Cool-gardie, the railway would pay; but, so far as we know, there are not sufficient minerals to make any material difference to the railway. If there were a mineral belt on the eastern side, it would support the views I have expressed. To construct a railway from Pellew Island to Barkly Table-land would be what I have called "robbing Peter to pay Paul," in view of the fact that large freezing works have been built at Darwin and at Wyndham. No doubt other works would be of advantage to the settlers in the immediate district, in the way of cheaper rations and quicker communication, but only one locality would be benefited. If coloured labour were introduced, I should be content with a system of indenture. I may say that I would rather watch a Chineso coolie work than I would work in a mine myself, though I have done a good deal of it in my time. I have not known a very successful closer sottle-ment up there. I think, however, that the Government works on the Victoria River were un-

#### (Taken at Adelaide.)

THURSDAY, 3RD FEBRUARY, 1916. Present:

Mr. Riley, Chairman:

Senator Kenting Senator Story Mr. Fenton Mr. Finlayson

Mr. Gregory Mr. Sampson Mr. Laird Smith.

William Wallace Andrews, Assistant Engineer of Railway Construction, South Australia. sworn and examined.

76. To the Chairman .- I have been in my prosent position for three years, and prior to that I was in charge of the Palmerston and Pine Creek railway for about eighteen years. I went there on the construction work of the second half on the construction work of the second half of the railway. During the twenty-one years I was in the Territory I was resident engineer. I stayed on in charge of the line until 1909. I am fairly familiar with this country, but I have never been on the Victoria Katherine. I have, however, been on the Victoria. River, which is pretty well west of Bitter Springs, and I know that the Victoria Downs is very fine pastoral country. It would mean lengthening the to swing out. So long, however, as the deviation is not too great, it is wise, from a traffic point of view, to serve the best country you can. I cannot speak from personal knowledge of the eastern line, but from what I have heard I should think the Victoria River country is better worth developing than even the Downs. So long as good country is tapped, a few miles lengthening does not make much difference. It is only from hearsay that I have any idea of the engineering difficulties around there. I know there are no large rivers, and I never heard of any serious floods beyond the Katherine-1 mean serious floods from a railway point of view. I believe there are often large swamps, but nothing to cause washaways. I am not in a position to say whether, as a general policy, it is advantageous to continue the line as proposed by South Australia.

77. To Senator Story. The line from Darwin to Pine Creek was constructed by contract. As to the climate, we have had some exceptionally good white men working there. When I left, there were two or three nan who had been employed in the contractor's time, over twenty-one years ago. They were employed on the maintenance of the they were employed on the maintenance of the line. Feebaps they did not do as good work as in the south, but they did as good work as any-holy there could. These, however, were exceptional men-good, sound men. The whole of the trount men—gona, sound men. The whole of the line, with the exception of the bridges, is laid with steel deepers. On the bridges there are weeden sleepers. At first we used karri for those secret stoepers. At first no used start for close sleepers, but they did not last very long; and since then we have been using New South Wales ironbark. We use it on the bridges, because there the white ante could not get at them. Timber sleepers are no good where the white ants are. The only timber we found to resist the white ants in the ballast was the cypress pine, which, however, is too scarce and expensive to use.

78. To Mr. Gregory.-Wo did not uso the Queensland ironwood.

79. To Sendlor Story .- In my opinion, there is not much to choose between the western and eastern deviation from a construction point of view. I consider the Victoria Downs country capable of furnishing as much traffic for the railway as the Barkly Tableland could; but I am only going on hearsay as to the eastern part of the country. I know the western part personally, and the Victoria Downs is first-class country. As to the mineral prospects north or south of the Katherine, I know that the mines north nover did very much. I have no knowledge of the Marran-boy tin-fields, but Mt. Todd was in operation then. I know nothing of the country south of the Katherine, or of the country south of the Macdonnell Ranges, because the furthest I have been north is Oodnadatta. I think a good deal of labour could be saved by taking the line from the south, though I do not anticipate there would he much saving in regard to material. You get your rails delivered at Darwin at very little more than at Port Augusta-you have 250 miles to go from the north, and 450 miles from the south. The extra cost would be, I think, in labour. That is, you can keep up your supplies of labour better from the south than from the north, and you get acclimatized as you go north. The maintenance of the Palmerston to Pine Creek line would take only thirty-five or forty men altogether. The line itself was built with coloured labour, but we had European gangers. In regard to the latter, there was trouble, because In regard to the inter-there was trouble because they were always coming and going; it was the usual thing—too much drink. Drink is not the only cause of men breaking down, because some time I was there concrete sleepers were only in sleepers—from 10s. to 10s. each. I think that, at the experimental stages. I have not used such

sleepers, though, of course, I followed Mr. Joseph Timms' experiments. I think these concrete Timins' experiments. 1 timins these consisted sleepers would only pay to use at present on lines with very heavy traffic, where heavy construction is required. They would cost a lot more than the others to handle, on account of their weight. I do not think these sleepers would save much on current maintenance, but they might live much longer, and the cost of renewals would not be so great. The road would, however, in my opinion, require just the same attention. I may say that of the steel sleepers used on the Palmerston-Pino Creek line, the greater portion are still in, and many have not had to be touched in the way of many mare not man to be touched in the way of nacking or straightening for years at a time. The traffic was very light; but still they held the road so well that they had not to be touched. I have heard that they are now using a different pattern of steel sleeper, though not to replace the old sleepers, but to use with the heavier rail. I do not think that the new pattern is more suitable for the light rail. I like the old pattern for light traffic. It is a stamped steel sleeper, which holds the ballast in it, and it can be used on curves. It is hard to describe the peculiar shape, but it holds the ballast in such a way that it does not shift at all. The use of concrete sleepers entirely depends on the type of sleeper. In some experiments there has been a lot of trouble with the concrete disintegrating under vibration; but it is claimed that that difficulty has in some of the recent sleepers been got over. Of this, however, I cannot speak from personal experience. None of these sleepers, so far as I know, have been used in Australia on railways, though some have been used on the tramways laid down by Mr. Timms.

80. To Senator Keating .- I could not say whether these sleepers are of Italian design, and I do not know how long they have been down.

81. To Mr. Gregory .- The steel sleepers rusted somewhat in the Palmerston station yard, where they were exposed to the salt air, otherwise they they were exposed to the salt air, otherwise they lasted splendidly. As to wooden sleepers, the white ants are very bad. We tried jarrah, and the white ants attacked it, and we also tried New South Wales ironbark. We have not tried Queensland ironwood; and I dare say it was a question of costs. We wrote to Queensland at the line was the state of the stat the time we were trying the timbers, and I do not recollect the Queensland wood being recommended to us. The ironword grows in the Northern Territory, but the trees are so far apart that it would not pay to got it. I have not followed up the experiments with concrete sleepers on the tramway. There is a far greater hammering action on railway lines than with the lighter cars of the tramways. If it could be ascertained that these concrete sleepers were suitable for heavy train-loads, it would be worth while inquiring whether they could not be manufactured on the rivers and creeks of the Northern Torritory. It is a question of whether you can get the gravel on or near the spot, because every mile of cartage adds to the cost. I an speaking of cartage by horses and drays, as against rail carriago. I would not recommend wooden sleepers in that portion of the country. I have not used powellised sleepers. I do not know of any having proved defective. There has been a very heavy increase in the cost of steel

but I am not property to give an outside opinion.

I have seen so much damage done by white ants
to jarrah that, personally, I would not touch it.
Ironbark would, I believe, in many cases last
much longer. The little white ants down south are a very different proposition from the Territory white ants, which are nearly as big as bull-ants. As white the proposed deviation to east or west, a new mineral discovery would decidedly affect my re-commendations. The fact that there was a tin area 40 miles square and 14 miles from Bitter Springs, would most certainly affect my recommendations. I do not pretend to be able to make a recommendation beyond saying that it would be worth lengthening the line a little to get traffic by tapping the best country. I should hardly think that you could get sufficient traffic merely from the pastoral resources to warrant the construction of the line. But the point is that we do not know what will But the point is that we do not know while will follow the pastoral development, which is a good thing to start with. There were practically no efforts at clear sottlement at Darwin in my time; the most has been done since the Commonwealth took the Territory over. I know of no cases where closer settlement has been successful. I do not think you will over develop agriculture with white labour—that the growing of rice, cotton, and so forth, could be successfully carried on by a white population.

82. To Mr. Finlayson.-I think that the establishment of freezing works at Darwin would lead to a very large stocking up of the courtry, and to a very large stocking up of the country, and this would bring a certain amount of traffic to the line. I do not think the line would be used for stock, except from the Katherine to Darwin, be-cause there is good travelling country to the Katherine. From Darwin to the Katherine the country is very poor, and I do not think you will earry much stock on the railway south of the Katherine. The extension of the line south of the Katherine. The extension of the line south of the Katherine would not result in any great direct stock traffic; but indirectly it might. The transport of cattle would be the main source of revenue, and the mineral traffic would assist. I am a great believer in the mineral resources of the Territory. It needs the conjunction of all traffic to make a railway pay. Primarily the line should go direct towards the mineral districts and good go direct towards the mineral districts and good cattle districts, providing the lengthening of the line is not too great. If the proposed line is to be part of the main line, the lengthening should not be very great. I approve of the idea that the extension of the line merely as a local pro-cession of the line merely as a local proposition would not be worth much; but it is the fact that it is a link in the chain of the main line that gives it its value. The extension of the line for local purposes would be difficult of justification, but it is a different matter altogether when it is part of the main line. I regard the Victoria River district as good pastoral country. From what I have heard, I should think that this pastoral country would be better opened out by Wyndham. So far as I know, there are no difficulties in construction. An extension of the line towards Bitter Springs would be worth favorable consideration if there were good pastoral country there which could be developed once railway connexion was given.

83. To Mr. Sampson.—The present carrying capacity would, I suppose, give an indication of possible future developments; but my opinion is really of very little value on such a matter. I am not in a position to express an opinion as to from the north southwards.

but I am not propared to give an off-hand opinion. whether the Victoria Downs will develop an agri-I have seen so much damage done by white ants cultural population. If I were charged with the to jarrah that, personally, I would not touch it. duty of developing the Territory, I should go for a through line, and not for lines running from suitable ports inland, as is the case in the various States. My idea is to have a trunk line, because we want a backbone for any system of railways, and not isolated branches. In planning a railways system, I think you want a trunk line with branches to it. The Territory would, to a great extent, be isolated if there were these local lines. The development of the Territory will, I think, depend principally on the expert trade. If there were a system of railways running from the coast inland, with freezing works at the various ports, I think you would find it difficult to induce people to go to the Territory. The importance of the ports would depend on the amount of traffic for the trains. But, first of all, you have to get your people there. There are not the same inducements for people to go to the Territory as to other places in the Commonwealth. The great descriptions of the commonwealth. advantage, to my mind, of a trunk line over a system of lines from the coast is the closer comsystem of these true the coast is the closer communication with the other States it would give to the Territory, and this would tend to induce people to estile there. I think that at first the population to the Territory tory will come from the south, and not from immigration. I have not propared a list of reasons for preforing a trusk line, but I have always held the opinion that a main trunk line is essential to the decolorate of the south o tial to the development of the country. I think that, by a system of water conservation, irrigation colonies might be formed in the northern portion of the Territory—that is when you have the labour to make the agricultural settlement. The idea is, I think, practicable. The trouble is, that the rainfall is only for three or four months in the year. Conservation dams could be made; but without the labour that would want be not be the fact. could so made; but without the natour that would not be one of the best means of solving the ques-tion of settlement. With the necessary labour, it is practicable to store water and establish irri-gation settlements, and by that means have closer soltlement areas. Many of the rivers are peren-nial. I have in a second way followed the nial. I have, in a general way, followed the exniai. I nave, in a general way, followed the ex-periments that have been going on in regard to the callivation of rice, cotton, and so forth. As to dairying areas, there is, of course, the tick trouble anywhere near Darwin. I suppose that the tick is possible of eradication.

84. To the Chairman .- It only adds about oneeighth to the cost of the sleepers to lay down a 3-ft, 6-in, gauge on sleepers for a 4-ft, 84in, gauge, with a view to subsequent alteration, and I would not think it worth while to depart from the present plan. The bridges, I think, are to be built for the broader gauge, for which it is wiser to

85. To Mr. Gregory.—I do not think much has been lost in interest and so forth; but it is a matter of figures and probabilities. There is no danger of the long sleepers breaking if they are properly packed. The packing must be done under the rails, and that is a matter for the engineer. If the longer sleepers crack in the centre, that is a matter of seeing that the packing is properly

86. To Mr. Fenton .- I think it would be wise to proceed from Oodnadatta north, as well as Lawrence Allen Wells, Deputy Commissioner of ante will cat green paw-paw. It would be found

87. To the Chairman.—I have had some experience of the Northern Territory, having spent a good many years there. My first experience was on a survey of the border of Queensland and the Northern Territory from 1883 to 1880, and after wards I was engaged in exploration work.

My last lange experience was in the Victories Rues.

My last lange experience was in the Victories Rues. My last long experience was in the Victoria River district, where I made a survey from 1005 to 1008. Altogether I have seen a great deal of the Torritory. I am not in favour of continuing the line right down from Oodnadatta, because I do not think that is the best line, as a paying proposition. I favour parts of the line. The part now being investigated would, I think, form part of the main line down as far as Daly Waters or Nowcastle Waters. I should think that the line from Katherine River to Bitter Springs would be continued now. I have no knowledge of the Torritory about Bitter Springs, but I have been all about the Katherine. I do not think that the country below Katherine to Bitter Springs is any good. If it were attempted to travel fat stock through that country they would be found to get low in condition. There are not many cattle about that locality. I think that a railway would cause some development, provided there were meat works at Darwin. I think it would benefit the country from Newcastle Waters and south-east of that. I do not think the westerly deviation would be quite justified. I do not see any great benefit to be obtained, because the cattle there now could easily be taken into the Katherine, where they are taken now. They often have to go that way to get to the south, because the other way is not open except in good seasons. I know that part of the country well, as my survey went through it. There is only a small patch of good grazing country at Willeroo. If the railway took a swing over there, it would be only to the benefit of that part, and the benefit would not be much. It would be all right to go on to Bitter Springs. In the Territory the tropical rains are about Christmas, and last about two months, and the cattle build up quickly, but will not stand driving over that class of country. It is scrub country, with long grass that will not feed. There is no sheep country for 150 or 200 miles south of Darwin; but below that there are very good areas in the Ord River country, at Wave Hill and Victoria River Dawns, and Sturt's Creek, and there is a large patch of undeveloped country south-east of Wave Hill. On the Fitzrey River country sheep stations have been running for years. On Ord River a small flock is kent, and they get the same prices for wool as if down south. From Camoowcal to Anthony Lagoon is good sheep country. I do not think there is any possibility of closer settlement or small farming. There was an experiment in farming tried; but there was nothing in wheat, because they do not get the rain at the time it is wanted. The rain starts about Christmas, and is all over after the end of March. That applies down to Wave Hill. There are white ants, and I brought away a piece of sheet lead in which they had caten seven or eight holes in order to get at wood, and they had also

Federal Taxation, South Australia, sworn and examined. have damaged a set of billiard balls at Port Dar-

western portion. About Musgravo there is suffiwestern portion. About Musgrave there is suffi-cient country for a few holdings. About the Charlotte, and right up to Alice Springs, is good pastoral country, and it is all held now. Some of it is good sheep country. I think the line should be extended from the Katherine south, as part of the main line. The other line should be completed in some way or other; but I think it should go from Bitter Springs to Camooweal.
There is good country all the way, and most of it
is sheep country. The greatest population is on
the east coast of Australia, and this would give direct communication. It would be a good scheme if a line were taken from Newcastle selicme it a line were taken from Newcastle Waters west. That would avoid crossing any rivers or creeks, and it would tap all the sheep country; it would be just north of the desert. It would be of some advantage to the Tanami gold-field, and it would be a much shorter distance to Port McArthur than to Darwin. There would not be much chance of getting water be-tween Newcastle Waters and that part, except by well sinking or boring. I favour the east route, because it would benefit the Barkly Tableland. I think that the vestward deviation would be too far away to benefit the Tonami goldwould be too lar away to benefit the Innam gold-field, and that it would be costly, and subject to washaways and so forth. It is very rough coun-try. When I said before the Commission that try. When I said bolore the Commission that there were many miles of good country in the Victoria River district, I meant Wave Itill and the southern half of the Victoria River Downs, and the belt of country lying south-east of Wave Hill. The people occupying the land could send their stock to the Katherine; but there are no sheep yet, because there is no railway. I think a line should be surveyed running westward from Daly Waters or Newcastle Waters; it would be an easily-constructed line. When sheep get into the country I think the line will pay; but it will not pay only with cattle, because people would rather drive cattle than put them on the railway. The belt of tin country between the Katherine and Bittor Springs was discovered after I left there; but there is tin all through that country. I think that mineral development, added to the pastoral traffic, will go considerably towards paying the cost of the railway—that the mineral development will mean much, particularly in the Macdonnell Ranges. I would continue the Oodna-datta railway to the Macdonnell Ranges, but I would eventually bear off to the east. I would continue the Oodnadatta line to the ranges, and then continue the line north. My only knowledge of minerals in the Macdonnell Ranges, or northern Australia is only from reading. As to the climate. my opinion is that a white man can work where a blackfellow can, if you pay him to do it. I do not say it is nice work. My experience is that I took five men there from Adelaide, and we worked the whole of the first summer. We had done destruction at the superintendent's quarters to climb mountains and clear large gum trees, at the Cable Company's place. The house there and the men could there do as much work as any is built on concrete blocks. I know that the white —as much or more than any coloured men. In

Darwin the climate is a bit different; but I think I could do as much work there as any black man. I think the climate is better down about Wave Hill and Victoria River. In the northern part it is very trying. I do not see why the men engaged on the Pine Creek to Katherino railway should not only excellent health if they do test get too much drink.

89. To Senator Keating .- On the eastern side I do not think there are any agricultural possibilities. I would not speak in this connexion with any authority from Darwin as far as Pine Creek. I say that the country is no good for stock. As to agriculture or tropical products, for stock. As to agriculture or tropical products, I do not know much about it; but I know there is a lot of stony, rubbisly country, without any good soil. On to Bitter Springs I do not think there is any land in the locality which is capable of agricultural production. I have seen similar country, and it is no good. This line must depend virtually on stock—weel and produce going in, and supplies coming our. They would have to freight the cattle. Try would prefer to travel the certical fit the country were read councils but the cattle if the country were road enough, but this country is not. I think the Barkly Tableland people would make use of the line to send cattle to Parwin. I do not that the proposition to connect the tablehard with lost McArthur is a good one at pre ent; but when the country pets covered with slacep it would pay to have the line. There is no immediate prospect of that, and I do not think the line is moresary. The line connecting with the west would be part of the scheme; but that is an ultimate, rather than an inspediate, proposition. I think that line to the west should be see by as well as the line connecting Bitter Springs with Darwin. The Katherine to Buter Spring railway is the most important and urgent.

90, To Mr. I. Popular - The Par Spull be extended to Newcostle Waters. Penling a enryey, I would not say whether a like proceeding pen-rally along the t legraph it with a 2 weestly or Daly Waters, or a direct route would be best; that is a matter for inquiry. If the cast vice not that is a name of required. It the contraction too hands, it would be preferable to have an extert elevation, in view of the fact that the line would touch the mineral field, the good passions. toral recuter pe the head of the Roper River, and guerally good overy all the way south. That cest could be reduced by keeping clear of the head waters of the Reper River. In making the line from Darwin go through Barkly Tublelands to Campoweal, I would suggest that the doviation should be about Newcastle Waters, which, I think, eight to be about the central pivot or point with railways running north-outh and east-west. My objection to the westerly deviation is largely becau o it is difficult country from the Ketherine to Willeroo; and, recordly, I do not think that railway would be used at cP, because the country is suitable for travelling stock. The pastoral country between Bitter Springs and Newcastle Waters is only foir. In env eese, I think that the lir from Katherine River to Bitter Springs ought to be gone on with, if the pastoral industry is to do anything in the Territory for many years to

91. To Mr. Semoson .- I think that the swing over towards the Barkly Tableland should be at eleut Ne reastle Waters. The construction to that point would depend on the immediate gathering ground. I think that the bulk, or, at all everts, but of the our ry to be served would lie

to the westward, and would be utilized for shape It would be advisable to construct the line of the route to serum the most traffic up to the . . .eastle Waters point. Presuming that the engincering difficulties are not too great, the east ru swing would secure the most trafile, and I could supply foures later on to show that. I do not think that by running the line through the Victoria Downs country you would increase the traffic, and the engineering difficulties are too great for running the line through that country. I hase my objection on the fact that the cattle from Victoria Downs will be driven, and that you will lose the traffic of the Barkly Tablelands. Whother the westerly deviation or the easterly one be taken the line has to go to Newcar' Waters, and from that point it could be taken conveniently through the Barkly Tablelands. Wherever you put the line the same number of cattle or eleep will use it, but the westerly device tion will be the more costly. I base my objection on both the engineering and cattle difficulti-The cattle on the Victoria River are improving overy year; in 1905 there were 10,000, and last year I am informed there were 17,000 head of calves branded.

C2 To Mr. Gregory -I spoke of the railway ru: ning to the Western Australian boundary, and I chould say that the average carrying capacity anouts say that the average carrying capacity for sheep on the best country with fences and wells would be shout fifty sheep to the square rule. I do not think that, in any case, the rais very will pay ammediately. I should say that when the railway gots to Bitter Springs the trade from the Barkly Telelands will improve yearly. As to developing Victoria Downs from the nearest port, you could not run a railway from Wyndham owing to the creeks and rivers. I think the country three is all the same, and a great deal worted then between Katherine and Willeroo. The floods of territor of the three try in the flood of the westerly direction would carry some millions of sheep, and the line might pay expenses in years to come. I think there are great possibilities for conserving water for irrigation purposes on the Victoria and Wickham Rivers, and I think that white labour could be successfully utilized for that. There are deep ravines and other facilities for conserving water-the Wickham River in particular-with rich basalt downs in the vicinity. have not heard of any success in closer settlement near Darwin, There is good country at the Kathleen Falls, Flora River, and the cotton I saw there looked well. I think that in the Wickham River country you could irrigate large areas, arthere is no reason why there should not be irrigation colonies as along the Murray. As to irrigation colonies as along the Murray. getion along the Katherine and the Daly, you must remember that a tremendous amount of water is required for this purpose. I think that irrigation is possible, as I pointed out in one of my reports. At Kathleen Falls an enormous arount of water passes over whether the season be good or had. Closer settlement, on a large erale, depends on what is grown and the markets. I think the dairying industry could be established, and should do well. It is a favorable climate for dairy cattle. I would not like to say that it is good for cattle within 200 miles of the north coast, and it would be necessary to clear that country. I connet areak as to the cultivation of sugar, but I think the land is rich enough for anything on the Victoria River.

93. To Mr. Fenton -I agree with the statement that there are about 10,000 miles suitable for dairy production if there is a railway, and the railway I favour would tap good country I do not think you will ever get the railway to the Longreach in the Victoria River.

94. To Senator Keating .- As to report of Mr. Combos on water conservation I do not think that he went to the Victoria River. There is a big fall from the Wickham down to the Victoria River, and water could be conserved and carried on to good land. You want hilly country for water conservation and irrigation, and I think this would be good holding ground.

95. To Mr. Sampson .- I do not think there are sufficient lagoons adjacent to the rivers which might be used for water conservation.

With the consent of the Committee the following additions are made to Mr. Wells' evidence .-Commonwealth of Australia,

Deputy Commissioner of Federal Taxation, Adelaide, 9th February, 1916. To the Secretary, Parliamentary Standing Committee on Public Works, 120 King-street, Melbourne. Dear Sir,

on Public Works, 120 King-street, Melbourne.

Whilst tendering my evidence before the Commiss on in connection with railway development in the Northern Territory, I was invited to state the numbers of atock from which produce would be derived for feeding a line it completed from Port Darwin to Newcastle Waters, and the Completed from Port Darwin to Newcastle Waters of the proposed line, I feel convoicant to express an opinion as to the development which should fake place provided a line or railway is also constructed from the proposed terminus in the vicinity of Newcastle Waters to line Wastern Autorilan and Control of Newcastle Waters to live Wastern Autorilan Darwin, and a line is not made from Newcastle Waters to Port McArthur, I am of the opinion it would be safe to estimate that, when properly developed, ha western lands, which include a portion life on the proposed terminated the central control of the central control of the proposed terminated the control of the central centra

of the overland tolegraph line would other settlers from delivering extitle a "titted nan line and the would callevering extitle a "titted nan line a line and a line a li

A line from Kathermo to any part of the Victoria River would present couraous difficulties in our traction and manhounce if attempted in a direct course. Herewith I forward copies of former reports which may be of some value to the Commission.

Yours faithfully.

L. A. Wetts, Deputy Commissioner of Federal Taxation.

20th May, 1913.

A. B. Monerieff, Esq., Commissioner for Railways,
Adelaide.

Addaldo.

Doar Sir,

In response to your request, I have much pleasure in response to your request, I have much pleasure in surprise to the development of the Northern Territory and other lands by the construction of railways.

Some few years ngo, and before it had been definitely decided to extend the "Ood-madatin" has in a northerly decided to extend the "Ood-madatin" has in a northerly decided to extend the "Ood-madatin" has in a northerly decided to extend the "Ood-madatin" has a northerly decided to extend the land to the "Ood-madatin" has a fine from the continuous to the total to the considered the essay to go the contract of the plants, and the considered the essay to connect with the above-mentioned proposed route at Cloneury or there-abouts would open up a larger extent of fine pastoral lands suitable for sheep and extite railing.

From Hergolt Springs to the Queensham barder the country may be accepting from heavily to fifty sheep per equare mile, and from there northerly to Cloneurry it would average about ten head of cattle or fifty sheep per equare mile.

All the southway assisted land cashed of carrying Country and the country may be a suited on the control of the sheep per equare mile.

per square mile.

All the south-western portion of Queensland is from fair to very good pastoral land, capable of carrying everal million shorp, from which a railway would resp

a baseft. Herewith is a copy of my report to the Royal Commission appointed to inquire into and report on proposed railways and harbors in the Northern Territory. As the time is brief, I am unable to enter into much detail on the subject, but I hope the information as contained herein may be of some service to you. Yours faithfully, Ill.

L. A. Walls, Deputy Federal Commissioner of Land Tax.

Extract from letter received from Mr. R. Townshend, General Manager of Victoria Biver Downs, Northern Territory, dated 7th June, 1913.]
A survey party is to be out here shortly to continue or trigomenterical work from Hawk Knob ens. to Newcasile. No doubt you have seen thy in Architecture of the Control o

them.

I am not in love with Bitter Springs as a Capital Site for a long time to come, money would be netter spent in other work.

William George Toop Goodman, Chief Engineer and General Manager for the Tramways Trust. Adelaide, sworn and examined.

96. To the Chairman .- The Tramway Trust have constructed 100 miles of tramway in Adelaide, and we have used wooden jarrah sleepers throughout the construction until the last two years. We found that jarrah resists the ravages of the white ants very well, and in very few in-stances have we had to renow them. But the price of jarrahr sleepers has been steadily increasing. When we first started we paid 3s. 11d. each, while the last lot we obtained cost 4s. 7d. for 7 ft. 9 in. x 9 in. x 41 in., and this difference means £70 per mile, which, of course, is a very serious item when there are many miles. Two years ago a

proposition was submitted to us by Mr. Joseph From to use his patent reinforced concrete sleepers. We went very thoroughly into the matter, and laid several miles of track with them. These sleepers cost much more than the jarrah Ances skeepers cust much more than the jarrah skeepers, but owing to their size and balk, instead of laying them 2 ft. 6 in. apart, as with the jarrah skeepers, we put them 3 ft. 3 in. apart. This reduced the number per mile from 2,100 to 1,600. We have fattl altogether 6,381 concrete skeepers, and these fees learn out the track in the state of the state and these have been on the track, in some cases, nearly two years. On one route the cars have passed over the track 64,000 times, on another route 77,000 times, and on a third about 18,000 times since the sleepers were laid, and we have had no trouble whatever with them, On no occasion have we had to open up the road On no occasion navo we man to open up the loss and look at the electers or deal with loose keys. The read has been quite rigid, and the mantenance cost is less than with wooden sleepers. We find the concrete sleepers more rigid than wooden sleepers, and another feature is that they have an infinite life, practically speaking, as compared with the more or less definite life of the wooden sleepers. This, of course, is a matter of continuous and insulance in relieurs and is a matter of great importance in railway and ramway construction, though I speak only from a tramway point of view. I may say that there a tranway point or view. I may say that there ins been a small portion of the railway track in South Australia Isid with concrete sleepers, and also on one of the suburban lines in New South Wales, and I think they have turned out very satisfactory. I shall be glad, if the Committee satisfactory. I same or grad, it the Committee desire, to open up the track and expose some of the sleepers which have been down two years under the traffic I have mentioned. The concrete sleepers cost about £90 or £100 per mile extra, even allowing for the extra spacing. The cost of the concrete sleeper is about 10s. Cd., and the wooden sleeper about os. Od., the latter, of course, including adzing and so forth. As to handling, the concrete sleeper weighs on the average 3 cut., and the jarrah sleeper I cut. the average 3 cm, and the jarram security of 1 qr. 2 lbs., and both are the same length, namely, 7 ft. 9 in. The concrete sleeper, howover, is 6 inches deep while the arrah is 44. If I were to start to put down a new tramway track I' should recommend concrete sleepers. Our gauge is 4 ft. 84 in., and the maintenance cost with con-4 ft. 85 in., and the maintenance cest with con-erate is much lower than with wooden sleepers. I have land no personal experience of concrete sleepers on times work, and I should like to experiment before expressing an opinion, because railway construction is very different from tranway construction, so different that you really cannot make a comparison. The maximum load we get on a pair of wheels is about 8 tons, but we do get on a pair of wheels is about 8 tons, but we do not travel at such high rates of speed as on the railways. Our maximum speed is 28 miles hour, while on a railway it may be 58 miles. We have not yet made our own concrete sleepers, but we have arranged with Mr. Timms to take over the plant in order to do so. I do not anticipate, however, that the sleepers will prove much

97. To Senator Story.—The making of the concrete sleeper is a simple process. Very fine concrete has to be puddled into boxes, and the great ords has to be puddled into boxes, and the great thing is to make sure that it is properly puddled without any blow-holes. There would be no dif-ficulty in manufacturing such sleepers in the Northern Territory, provided the material were handy. The labour is unskilled, and all you require is cement, gravel, sand, and the reinforcemont wires

98. To Mr. Penton. In the case of the concrete sleeper the chair is embedded in the concrete, and steeper the cnair is embouded in the concrete, and attached to the reinforcement, and forms part of the structure. The rail has to alt on the chair, and is had sigid by cotter bolts. In railway work the rails would be all exposed to the weather, work the raiss would be an exposed to the weather, whereas in the case of tramways they are not. In no case have we found those fastenings work

1008c. They are long and tapering wedges.
99: To Mr. Gregory.—That is the only danger I would fear as an engineer, and it is a matter of

100. To the Chairman.—The maintenance men

would see that the wedges were kept right.

101, To Mr. Fenton.—I should say that the rigidity would make a difference in the resilience. cortain amount of resilience is necessary for

comfortable travelling,
102. To Senator Keating.—Resilience is more 102. To Senator Acating.—Hesilience is more necessary on railways than on tramways, because of the higher speeds and longer and heavier is my opinion. I do not exx why concrete sleepers for railway purposes would minimize the resilience beyond what is really safe; of course, I am speaking without actual experience, but that is my opinion. I do not see why concrete sleepers should not be made on the goal in the sleepers should not be made on the spot in the steepers should not be made on the spot in the Northern Territory. It is one of the advantages of the concrete steeper that, with a good supply of gravel and aand, all you have to obtain from elsewhere is the reinforcing material, chairs, and to forth. It is owned to have a practical proposition.

103. To Mr. Finlayam.—We give them an average of 20 days to dry, and this should not be reinforcing in a dre elimine. It is a decided advantage of the state of t

reduced in a dry climate. It is a decided advantage not to allow them to dry too quickly. I should strongly recommend that a trial be given of these sleepers, because the question of the wood supply is a very serious one. In a country infested with white ants you want something to resist the pests. No timber is ant-proof, but jarrah is the Lest of the lot.

## (Taken at Adelzide.)

FRIDAY, 47H FEBRUARY, 1916.

## Present:

Mr. Riley, Chairman;

Senator Keating, Sonator Story, Mr. Fenton, Mr. Finlayson,

Mr. Gregory, Mr. Sampson, Mr. Laird Smith.

Henry Yorke Lyell Brown, sworn and examined. 104. To the Chairman.—I am out of business now, having resigned about four years ago from now, having resigned about four years ago from the position of Government geologist, which I had held for about twenty-nine years. I have been up to the Tarritery on five or six occasions, and have spent good deal of time there. I think there are great possibilities in mining, particularly gold, though there are other ninerals like capper, and tim. Gold, however, is the chief thine. As wet they have not hem deconer speak. thing. As yot they have not been deeper, speak-ing generally, than 200 feet, and I think they ought to go deeper. The most important places from a mining point of view are Pine Creek and Union. There are several other gold-bearing districts, but those are the principal. I have been through that part of the country where it is proposed to build this railway extension, but there are no mining possibilities just there,

Primary rock is favorable to minerals, and this is mostly flat tableland. The nearest mining country is about 15 miles after you mining country is about 15 miles after you leave the Katherine, at Maude's Creek; after that it is all plains and tableland. I do not think that the section sellows on the word mining. I have would do much in the way of mining. I have a knowledge of in mining, but the Marranboy field is a discovery since my time. I think that the count along the telegraph line, in a general direct, would test develop the mining industry of the Territory. A main trunk line would be the can trunk line would be the can trunk line would be the can trunk line. The section now proposed will form part of the The section now proposed will form part of the main line. I should say that the railway will main time. I should say that the ranway will lead to stations being taken up. There are a few stations further coult, but only second-class, and sheep do not do in that part.

and susep uo not ao in that part.

105. To Senator Story.—In my opinion the mineral resources of the Territory are well worth developing. I think that mining, together with the pastoral industry, when you get further south, will prove the main sources of revenue. The pastoral industry is not much good in the trapical and the pastoral industry is not much good in the trapical pastoral industry is not much good in the trapical pastoral industry is not much good in the trapical pastoral industry is not much good in the trapical pastoral industry. parts, where you have to contend with red-water, and so forth. I do not think that the deviation and so lottle. I am not timing time time deviation to the west would go far enough. So far as I know there is no mineral country there, but it is good soil on besult plain. A line running due west would tap the Wave Hill station.

106. To the Chairman .- The tin-field does not go very far, and is very patchy. In my opinion no minerals will be found immediately south of the Marranboy. I have here a geological map which I prepared and which may be of some use to the Committee.

107. To Senator Story .- No valuable minerals have been found near Tennant's Creek, but there are indications of minerals. There are great lodes of very good iron ore there. After that we do not or very good iron ore there. After that we do not got any minerals until we reach the Macdonnell Ranges. There is nothing very important in regard to minerals at Macdonnell Ranges so far as hose found, but there are a good many got claims worked there. They fossick about and sink four feet, but then if not continue, owing to a few feet, but they do not continue, owing to want of capital. I have reported several times on want of capitat. I have reported several times of this mineral country; and as to the possibility of large reefs or lodes being developed, that is a matter of further prospecting. The indications are all right-quartz reefs, and so forth-and they have had 4 or 5 ozs, to the ton. All the working is by private parties. It is very expensive working by privato parties. It is very expensive working on account of the cost of stores. They get their stores from Codendatata, and it is very costly, and prevents conomical prospecting. It is first-class country generally in the Macdonnell Ranges: splendid grass country, and, I think, fit for agriculture. It is fairly well watered, and at Alice Springs there is abundance at 50 feet, while in the rainy season the crecks are running. It would be nossible to conserve water for irrigation, and I be possible to conserve water for irrigation, and I should say the country would be suitable for should say the country would be suitable for dairying, though it is very far from the market up to now. The climate is very good; het in the day and cold at night. For three or four months

the way of opening up that country, and would have a good effect in reducing the deficit on the line running to Oodnadatta White men do not work very hard in the Northern Terrifory, and I work very hard in the Northern Territory, and a do not think they can keep their health. The measurages are so bud that, north of the Katherine, you have to get into a net, and the Katherine itself is had enough. I would place the mospitio country north of Bitter Springs, such as which them is a better climate and fewer. south of which there is a better climate and fewer mosquitoes. The men, after working all day, have to creep into a mosquijo net at night, and do not get any alcep until very late, and are not fit next get any accept units very rate, and are not in near day. Men engaged on the railway work may be all right for a time. The first time I was there for eight months I had no fever, but the next for cight months I had no fever, but the next time I was down for a month. I think that when one grees the first time one can stand it, but not say wall subsecutive. I do not favour the development of the country by short railways running into various ports, as, for instance, Port McArthur and Wyndhaur; a main trank line is the best, though these short lines would be very useful to the stations. I do not think the Northern Territory will ever be properly developed until we cet a main line through from south to Northern territory will ever us properly developed until we get a main line through from south to north. Such a line will make a tremendous difference in the way of opening the country. At present the journey is such a long way round that few people will go.

103 To Senator Keating .- The geological map 103 To Senator Kenting.—The geological map of which I speke was prepared in 1898, and does not allow the Marranboy tin-field. No systematic and complete geological survey in the Northern Territory has been made for the Government of South Australia, though I made several trips there for special purposes, and to see different mines. On one trip I examined the coast as far as the McArther liver; that was since the map was published. I have also made a trip to the vext. It would not be fair to myself or the Territory to regard this map as the result of a syswest. It would not be fair to myself or time ter-ritory to regard this map as the result of a sys-tematic survey; it is only the first map, and sub-ject to considerable undiffications, though, in a general way, it is all right. Mine have been geological recoinneiszances, made as discoveries were reported; nothing anterior to discoveries. The only thing that has been done in the way of only thing that has been done in the way of systematic prospecting is bering for coal and gold under Government supervision within the last ten years. I recommended Port Keats for boring for coal. The longest time I was in the Territory was about oright months, in connexion with prespecting and discoveries. I went to Darwin and Tanami. When I speak of the Territory as affering nessibilities for successful mining enteroffering possibilities for successful mining enteroffering possibilities for successful mining enter-prise I give an impression correquent on my caveral visits. As to which railway route would best serve interest interests of the country from Pine Creek southwards, I chould say the first mineral-hearing country is due south, and down the telegraph line, which, I think, should be olilowed. To the west there is some really good agricultural country towards Wave Jilli. It is not far from the Kutherine, and it extends into Western Australia. There is not such good coun-Western Australia. There is not such good country on the eastern side.

109. To Mr. Gregory.—There is no later geo-

day and cold at night. For three or four months in the year you get ice nearly every night. Alee Springs is about 1,800 feet above scal-heel, and there are hills 2,000 to 3,000 feet above. The country south of the Macdonnell Ranges is mostly pasternl, and there are stations are consulted and the state of the state o north from Oodnadatta would be beneficial in auriferous area. In the north there is not a very

logically examined when we were boving for gold, and we brought it up at 700 feet. I assume, from and we brought it up at 700 feet. I assume, from my knowledge of the country, that these lodes go to a depth; indeed, they have been proved by the diamond drill to do so; but shafts ought to be sunk. The diamond drill is used to find if the gold goes down to a depth. The shoots are usually very patchy. As to the diamond drill being like working in the dark, it enables you to find whether or not a lode extends down; but in order not to miss the best way is to sink a shaft. The not to miss the best way is to sink a shaft. The country also contains other metals; there is a wolfram mine near Pine Creek. I think there is train mine near Fine Creek. I can't call to be plenty of good mining timber: it is not very large or heavy, but I think there is plenty for ordinary purposes. For big mining work some would have to be imported. Mining is very expensive, and I think wages are the main outlay. I could not say that I would be content to open up a mine with white labour, because it is too expensive, seeing that the men get £4 10s, a week. Under ordinary circumstances I would not carry on mining with white labour. At Tanami the men are

25 a week. Very little work was being done
when I was there. I did not see a report a few years ago that there were 200,000 tons of rich ore in sight at Tanami, and I do not think it can be correct. I think that the alluvial gold in the correct. I think that the analysis gold the north has been pretty well worked out by the Chinese. Under the South Australian Government Chinese were allowed to obtain miners' rights, though they could not hold leases. I think enough boring has been done at Pine Creek for gold, and the next thing is to sink a shaft. I read the other day that there have been some very good results there. Much greater good would be done by assisting people to sink shrifts than by diamond drilling. There is plenty of water to be obtained; on the gold-fields it can be got within 100 feet. I fancy they get too much water at certain times of the year, and very little at another time. I think that, as a rule, water lasts all the year round in the water-holes. The artesian area over the northern portion of the Territory has been mapped out, and is shown on the map I produce. On the "Tableland" an effort was made to obtain artesian water, but there is no chauce according to the geological indications. There is no possibility of obtaining artesian water further north than between parallels 23 and 24. At present I think the pasteral resources are of greater value than the mineral resources.

110. To the Chairman.—There is any amount of ironstone, gravel, and sand, and the proposed railway will go right over it. It is very level country, and there is any amount of sund, which, I think, would be suitable for making concrete.

111. To Mr. Sampson.—I do not think that the British companies who spent large sums of money in prospecting, and then abandoned the gold-fields went down far enough. They spent all their money on surface buildings, electric lights, and so on. They never ascertained whether the lode went deoper down. The diamond drill has proved that there is gold below 200 feek, and it cannot be known whether it is payable unless shafts are sunk. These English companies often made their rooney on the shares, and nover intended to work the mines. I do not think there was any mining reason why these companies did not go desper, everything was in favour of the reefs going down. One reason why I favour the telegraph line route for the railway is that all the water-holes are there, and you generally find people round the water holes. It is all level country with no engi-

large mineral area, but gold has been worked to a certain depth, and the chances are that it continues to a greater depth. That country was geometries to a greater depth. That country was geometries are a greater depth. The country was geometries are a continued to the best route. There is no other reason why the legically examined whom worro bering for gold, and we brought it up at 700 feet. I assume, from my knowledge of the country, that these lodes go

country for graing.

112. To Mr. Laird Smith.—I believe that one of the English companies built a railway of their own, and, therefore, it was not the cost of carriage that prevented development. In the case of the tin-flelds the railway would tend to cheapen the cost of the carriage of stores. The Chinese did not develop the mines on lines satisfactory to mo, but I think they are first-class miners for working underground. There could not be better miners when under white control. Gockspur lines would be a means of development, but I think the main line is the principal thing.

113. To Mr. Fenton .- In the case of one mine at 350 fact there was so much water that they had to stop; there was a creek within 50 yards of the mine, and I think the water ran from there. Generally speaking, I think that the water in the mine was an indication of a fair subterranean flow, but a good deal comes from the surface. You can get water almost anywhere in the Northern Territory, fresh, with very little salt, and it would not do any injury to vegetables. I do and a would not so any injury to vegetables. To do not think that the subterranean supplies would be required for the purposes of settlement, because there is sufficient on the surface. If the people made dams in the rainy season they could concerve enough for all their requirements. I do not favour the western swing; it would be better to have a branch line running into the trunk line, and it would have to be carried on eventually to Western Australia. Climatically, and otherwise, white people generally can get on all right.

## John Alexander Voules Brown, sworn and examined.

114. To the Chairman .- I was in the Territory twenty-one years, and I represented it in the South Australian Parliament at the time of the transfer to the Commonwealth. I think that the only way in which the Territory can be developed is by a main trunk line going along the telegraph line as near as possible. It is not to be expected that people will go so far inland without some means of communication.
My experience of the Territory extends only from the coast to Katherine River; south of that I can the coast to inchiering liver; south of these around only speak from hearsay. I have not been around Bitter Springs. I would advocate a direct line with branch lines where necessary. Of course, it is too much to expect that the line can be built right off at once, and I have always advocated that if it were brought 150 miles further than Pine Creek, making about 300 miles, it would be sufficient for the time, which would enable people to take their cattle to the freezing works at Darwin. I also have advocated extending the I'ne from Ocdnadatta to the Macdonnell Ranges. This would be a means of enabling people in the pastoral areas to properly develon the country. I cannot say that the Torritory has made any progress in the past twenty-five years. I have not been there since its transfer to the Commonwealth. The railway has been extended for 50 miles, but I advocated 150 miles. With another 60 miles, the people in the Victoria River country and Wave Hill would be enabled to take their cattle in. It would never do to travel them overland to Darwin, because they would lose in weight three times what the freight would come to. The most convenient point for trucking would be the first nearest Victoria River. It is better holding country at Myndham, but they could go or much cheaper by truck than by road. Mr. Laurio has always told mo on no account to drive cattle into coast country, because the loss in weight would take twelve months to recover. By rail they are taken straight to the freezing works and have no time to lose in weight. From a defonce point of view I think the direct line would be the proper one; it would be a mistaken policy to have a railway running like a corkscrew. I favour the direct line, because, in a cattle courtry, a few miles driving is noither here nor there, so long as they do not get to the coast country.
I was in the Territory when Chinanen were introduced, and I worked with them and over them. I would not go to far as to say that the Territory cannot be developed except by coloured labour, it would depend a good doel on the work on which they were cumployed. If it came to mining, and the mine would warrant it, I would prefer white the mine would warrant it, I would prefer white labour. I never felt any ill-effects from working on the surface or below. I would not think of working a mine with cheap coloured labour if the mine would support white labour. I do not think it impossible for white men to live there. As I say, I was there twenty-one years, and I know people born and reared there, and who have been there porn and reared there, and who have been there for forty years. These people are getting old, but they are healthy and strong, and they have children and grandchildren. It all depends on the constitution. Women possibly suffer more than the nem. I had fever for a short time, but I do not think it did me my harm. White men can do railway construction and stand the climate, especially as they get farther away from the northern coast. People talk of cheap coloured labour, but it takes two coloured men to do the work of one it takes two coloured men to do the work of one white man. The Chinese appreciate the "Government stroke" very well, or, perhaps, I ought to say, they have a special "stroke" of their own when not working for themselves. The agricult development attempted by the Administrator, under the existing conditions, was bound to be a failure for several reasons. He was trying to fight against nature, and the existing conditions, with regard to land tenure, and so forth; it was only rasted energy. I expressed my opinion freely at the time, and I have never changed it. Instead of 1,000 people at Daly River at the end of twelve months, I said he would not have ten, and that has turned out to be quite true. There is no local market, and in shipping produce he had to contend with coloured labour markets, and with Queensland and New South Walco, where the wages are lower. If he had had coloured labour L do not think he could have made a success. Everything that can be grown in the Territory can be grown almost to better advantage in other places. Queensland is a better country than the Northern Territory. I have seen cotton, both wild and cultivated, grown in the Territory as well as in any other part of the world, but it cannot be grown with white labour. White labour cannot be grown with white labour. White labour can, of course, grow it, but you cannot compele with the cheap labour olsewhere. Cotton has to be gradually larvested, and cheap labour is necessary. I shall believe in cotton harvesting by mechanic when I see it—when I see a mechine machinery when I see it—when I see a mechine which can go between the rows and discriminate

ripe pods from green.

115. To Senator Story.—I do not know that in exterion of the line of so much as 300 miles in Oodnadatta is required to strike the ranges.

Anyhow, the present railway finishes in a lesselt, and is neother one nor ornament. If the rail way were extended from foodmodutat to the ranges there would be a possibility of reducing the loss on the present hore. At the present time there is practically a dead loss, and the loss would be reduced, even if the line were not made into a paving concern. As to any deviation, the unfields at Marrandoy have got to be proved, whereas the Victoria River pasteral country has already been proved. It think the railway ought to follow the telegraph line as near as possible.

the telegraph time as near as possible.

116. To Mr. Finlayson.—In view of the fact that there is a mineral field and excellent pastoral country around Bitter Springs I still favour the route I have inducted. I think the Victoria River people could, without much trouble and expense, drive their cattle to the railway line From my knowledge of the Katherine River district I think at is a saitable centre for the Victoria River people to entrain cattle to Darwin.

117. To Mr. Sumpson.—I have no personal knowledge of south of the Katherine, and I canned any which swing of the railway would bring mest-ecoune. So far as it has developed to the present the Victoria River country will bringstone traffic. I do not know that the pastern country out in the castern swing, or the western swing, is any better than that in between.

113. To Mr. Laird Smith .- I do not think the pastoral people would trouble a great deal to entrin their cattle when they had country through which to drive them. I would like to see the railway go right through, and I gathered see one rainway go right through, and I gathered that the Communeachth was in duty bound to construct it direct from north to south without any doviation to Queen Jand. Mr Mitchell, K.C., of Victoria, said that the Commonwealth could not go out of the Territory, but they are getting not go out of the Permory, but they are getting over the difficulty by attempting to go to Camooveal and connect. There is no time stipulated in which the work shall be completed, as I think there should have been, but I look on it as a solemn agreement with South Australia that the line shall go from north to south to South Australia. Without the raiway the country is usoless, because it would increasible to get people to go to these practically inaccessible places and try to develop the country. In the event of the railway being constructed from north to south I should not have the slightest objection to cackspur branches from the Queensland border into the Barkly Tablelands. It was always my idea that such lines would be constructed, not only from Queensland, but from New South Wales. The Barkly Tablelands and the Newcostle Waters trade would naturally gravitate to Queensland ports If the white ants are as bad on the south as they are on the north it would be a waste of money to use wooden sleepers. No timber will withstand white ants, though cypress pine will do so for many years. There are steel sleepers still standing after thirty years in the Territory. It is hard to say whether, if white labour had been imported at first for the lines in the Northern Torritory, there would now have been settlements. No man would live in the Northern Territory for preference; there must be an inducement to keep him there. I have always thought it a crying shame that men should hold 10,000 square miles of country in one block. Wave Hill is 8,000 square miles also, and that is not the rin is 5,000 square miles also, and that is not the proper way to develop the country. I do not sup-ness that on the 10,000 square miles held by the Victoria River Company, there are fifty-one whits

country I could not give an opinion as to whether it would be profitable to build a railway representing Libo,000 in interest, unless there was a reasonable amount of population, but the coun-try is at present useless without the railway. Whether such a railway as I recommend would be profitable without a much larger population in be profitable without a much larger population in the Territory is a peculiar one; but we have to do something with the Territory, which, without a railway, can never be developed. I should say that, eventually, the line will pay, and much sooner than will the east-west railway. Without a railway there will be no population. It is pec-sible that some big mining development may at-tract population; otherwise I do not see what is to bring it. There can be no closer settlement in to bring it. There can be no closer settlement in the growing of catton, rice, and similar products with white labour, and I do not see why these should not be grown with coloured labour; tropical products can be grown only with coloured can produces can be grown only with condition labour. I have always objected to the lessehold principle. I do not think the clearing and de-veloping of the land would cost much with coloured labour, and without such labour I do not see that there are any possibilities in the tropical see that there are any possionings in the opera-portions of the Territory. To protect the Terri-tory you would want an immense population if trouble came, and without a railway I do not see how we are going to defend it. I have heard that there is a large area of country that will grow tropical produce within a reasonable dis-tance of Darwin. I do not think that sugar will ever be grown in the Northern Territory, owing to the shortage of rainfall. Cotton, rice, and so forth grow remarkably well, but wheat growing is impossible. I do not think that the country has ever been prospected for minerals to any extent-not 20 miles on either side of the line. There are large belts of auriferous country north of the Katherine, but I am doubtful whether they have been sufficiently proved. I have been at Kalgoorlie, and I do not look on the Territory. from a mining point of view, as country as good as Western Australia, but the place has never been prospected any distance from a railway line. I do not think there is any possibility of coal. There are areas of tin within 4 or 5 miles of the line There is any amount of tin-hearing country-there are two or three districts I could mention-and I have seen specimens better than from any other place. In order to develop these propositions the Government would have to subsidize them. It would be as well to have those holders of large areas with money, so long as they com-plied with certain conditions—if there were those conditions. But I think that ten different per sons, owning 1,000 square miles each, would prove a greater source of revenue than one person owning 10,000 square miles. The land was taken up without classification or survey, and those who took it up picked the eyes out of the country. Mr. W. H. Stevens, the manager of several stations, has said that the Victoria River country compares favorably with any in Australia.

120. To Senator Keating .- As to the cultivation of tropical products, I know there have been some big failures in sugar growing, but most of it has been experimental. I have seen tropical products growing very well in the Botanical Gardens. As to the opinions expressed by Mr. Combes, I honestly think that there are better countries than the Northern Territory for tropical agriculture, and that is because of the soil. extension to Bitter Springs, but we have had some

people employed. The universal opinion is that the Commonwealth will honour the agreement made.

119. To Mr. Gregory.—Without going over the water almost a fixed by the common naturity, wants rain, of which it does not get sufficient. If the pastoral industry is to be the main thing we cannot look for an extensive population, but mining may cause an increase, and the agricultural onestion will actite itself automatically. That, I think, will be the evolution of the Territory— pastoral industry first, followed possibly by mining development, and agricultural settlement alterwards. I hold that view irrespective of the question of the use or non-use of coloured labour; it is not a factor which would affect my view. The difficulties presented in the way of obtaining a reasonably dense population would be equally the difficulties of any other Power. There are, however, people in some parts of the East so densely packed that they would be glad to take any country. I should hardly like to express an opinion as to whether the fact of our not settling the Territory with a fairly dense population would not afford an opening for some other Fower to cottle it with a population fairly dense. Any extensive coloured settlement from the East would be a great and serious trouble, but I do not think

there is any great danger of it.

121 To Mr Fenton,-I think one of the best possible things would be a fine mineral discovery, especially of gold Gold discoveries have been reported towards the west, but nothing of any value. I have always heard of the western side of the railway as being very much more barren than the eastern side, but I know nothing of the mineral prospects. A lot of money has been made out of the buffalo hide trade, but the animals do not in-crease very fast. They are located at Port Es-sington principally, and would not contribute to the traffic of the railway to any extent. I would and traine of the initially to may better. I would not like to express an opinion whether it would pay to keep herds of buffaloes. Goate thrive very well in Darwin. I do not think that the Terrory from a mineral point of view has been tested as it should have been, and the expenditure of a considerable sum of money in this direction would be advisable, as it is the only way in which the country can be proved. There have been considerable alluvial deposits there, and workings. The contention of mining men that where you find alluvial it must be shed from reels somowhere near has, I think, been bursted up in many instances. There has been no reef development to any oxtent in the Territory. I saw the other day that a bore had been sunk several hundred feet and had got 3-oz. stone.

(Taken at Melbourne.)

MONDAY, 7th FEBRUARY, 1916. Present:

Mr. Rilry, Chairman;

Mr. Finlayson, Senator Keating, Mr. Gregory, Senator Lynch, Senator Story, Mr. Sampson, Mr. Laird Smith. Mr. Fenton.

Norris Garrett Bell, Engineer-in-Chief and Acting Commissioner, Commonwealth Railways, recalled and further examined.

122. To the Chairman .- I do not know of beds of gravel or sand suitable for the making of concrete for sleepers along the route of the proposed difficulty in getting this material along the route from Pine Creek and the Katherine. The officer who surveyed this route is in Melbourne, and he should be able to give evidence on the subject. I have been told that there is sand and gravel along the existing line, but I do not know personally where this material can be obtained. As to the use of concrete sleepers for railway construction, experiments have been made during a number of years in Russia, Italy, the Argentine, and other countries, and many designs have been tried, but, according to the information with which I have been supplied, concrete sleepers have not proved S Success.

123. To Senator Story .- The concrete sleepers are reinforced. I read recently in an American journal that so far no efficient concrete sleeper has been designed.

124. To the Chairman .- I have seen the Timms patent, and have had letters from Mr. Timms, so that I am acquainted with his design. A recent work on permanent-way construction contains photographs of concrete alsopers taken out of a road in America after they had been for some time in use, and a statement appears in it of the number of sleepers experimented with, and the results of the experiments. The sleepers referred to did not prove's success, and were broken by the load that they had to carry. We have not gone further than the Katherine in the construction of earthworks along the route of the Northern Territory railway, and work has been delayed because most of the men who were engaged in it have been called upon'to repair damages caused by floods. It will be a few weeks before constructional work can be resumed. We have all the rails needed to finish the line as far as the Katherine, but have none for any construction beyond that point. At prosent it takes time to obtain rails. Steel sleepers cannot be obtained at reasonable prices; indeed, I doubt if they can be get at all. Rails cannot be imported just now. They cost about £10 15s. a ton in the Old Country, with another £5 a ton the contract of the contract o for freight, and see carriage is very uncertain. I am willing to experiment with concrete sleepers, though I have already tried them. I have not experimented with Mr. Timms' design. The concreto sleepers that I have used were designed to take bolts right through them. The Timms fastening is a better one, and allows the rails to rest on iron plates. No doubt a concrete sleeper could be designed which would suit both the 3-ft. 6-in. and the 4-ft. 81-in. gauge. The use of concrete for sleepers is not a new idea; it is one on which experiments have been made for many years. The first cost of concrete sleepers would be greater than that of wooden sleepers, but were they otherwise satisfactory the difference in cost might be compensated for by their longer life. Concrete sleepers are costly to make and expensive to carry, and, of course, increase the difficulties of maintonance, because they are so heavy. There are 392 mon working on the line to the Katherine, and they will be available for the extension to Bittor Springs if the construction of that extension. sion is not delayed too long.

125. To Mr. Gregory.—The railway is being made with earthworks and bridges suitable for the 4-ft. 81-in, gauge. That is being done in com-pliance with the Act. Moreover, sleepers to carry rails laid on the 4-ft. 81-in. gauge are being used. It is estimated in Western Australia that a jarrah sleeper there lasts about fifteen years. If the 3-ft. 8-in. gauge is to be used on the proposed line for 10, 12, or 15 years, it would be cheaper to lay down in the first instance a 7-ft. sleeper in-F. 16003.-I)

stead of an B-ft. G-in. sleeper. The traffic that is to be expected does not warrant expensive construction, the justification for the 4-ft. 84-in. gauge being the connexion with the southern lines. In my opinion, it is a mistake to use rails of less in my oninion, it is a mistake to use rais of less than 00 lbs, in weight. In Queensland, on several occasions, they have used a lighter rail, but they have recently reverted to an old determination not to use any rails lighter than 00 lbs. Such a rail allows the use of leavy engines and large trail loads. The revenue from the Northern Territory railway has largely increased during the past few months, an increase due greatly to the traffic caused by the extensions southwards; but we expect considerable cattle traffic when the meat works at Darwin start. The extension of the line to Bitter Springs and the opening of the meat works at Darwin should increase the traffic on the line, which I think will then pay working expenses, which I think wil then pay working expenses, though not interest on construction. As to the use of sleepers suitable for rails laid on the 3-th. 6-in gauge, the Crown Solicitor recently gave the opinion that there is nothing in the Act to prevent their use, and if there is no likelihood of the convertion of the line them the 2-th 5-in to the conversion of the line from the 3-ft. 6-in to the 4d. 84-in gauge within a reasonable period, money could be saved by using the 7-ft. sleeper. The price of powellised sleepers at Darwin is 8s. 4d., and of unpowellised sleepers 7s. 6d. each. The nowellised sleepers have not been in use long enough to enable me to come to a decision as to their merit. Some 500,000 have been laid on the east-west line, but they have not been down more than a few months. I do not propose to order more for the Northern Territory yet, and have been trying to get sleepers of Queensland timbers —blood wood, for instance—which I know to be —monou wood, nor instance—which I know to be suitable, though I have not succeeded so far. We get 8-ft. 6-in. sleepers for the east-west line at 4a. 3d. alongside the railway. I am aware that concrete sleepers have been tried by the Adelaide Tramway Company and by the South Australian and New South Wales relieve authorities thanks. and New South Wales railway authorities, though I have not tried them in the Northern Territory About 100 concrete sleepers are laid in a railway name and concern steepers are sent in a tanway near Sydney. These experiments are a better test of concrete sleepers than an experiment on the Northern Territory line would be, because the traffic is heavier, and I think that a trial of six months should be sufficient to determine whether the determine a suitable I I should have no chief. the sleepers are suitable. I should have no objection to trying concrete sleepers in the Northern Territory, but the traffic on the Northern Terri-tory is so light that the test would not be a severe one. However, I am following the experiments elsewhere, and am in touch with the Engineers for Existing Lines in the two States concerned. I know what the sleepers cost; I have obtained photos of the roads in which they are laid; and I hear from time to time about their conditions. I shall cause an inquiry to be made as to the oc-curence of sand and gravel in suitable localities in the Northern Territory.

126, To Mr. Laird Smith .- The objections to the use of concrete sleepers are these: The sleepers are costly to make and to handle, and are difficult to deal with when in a road. Under heavy traffic they are said to shake to pieces. In big centres, where there are plenty of maintenance men available, the weight of the elcepers is not of much consequence, but it is a serious matter in places where there are only four or five men for the maintenance of, perhaps, 20 miles of road. It is not clear to me that a saving of ballast can be offected by using concrete sleepers. Ballast is used below eleopers to distribute over the formation the weight of the train, while top ballast is

used to true the line and to deaden the noise of running. Bottom ballast would be required for any sleepers, whether wooden, concrete, or steel. Top ballast might be unnecessary for keeping concrete sleepers in line, because of their weight, but such sleepers would be very noisy to run over if they were not ballasted. Steel sleepers make a quiet road if they are properly boxed up. Such sleepers are used on the road from Normanton to Croydon, and that is a very quiet line to run over. Concrete sleepers on a sand bed, properly boxed up, might be a little hard, but would be quiet. I take as much interest as any one can in the experimenting that is going on, because I am desirous of obtaining the chappest and best sleeper that it is possible to get. All sleepers are packed below the rails only, the centre being left slack. That is done to prevent rocking. There would be no saving by using concrote sleepers in doing without ballast underneath. In wet country a great depth of ballast must be used to distribute the weight of the train over the forma-Whatever kind of sleeper you use you require the same number to support the rails. I do not think that any great advantage would be gained by using chairs gripping the flanges of the rail for about 6 inches instead of dogs, which grip only about I inch. There is no danger in running over concrete sleeper; they are perfectly safe. I have read that private railway companies expect to recoupt thomselves for expenditure on railways by increase. ing the value of the land through which the lines run. In Queensland owners of land in henefited areas were required to guarantee an earning of 3 or 4 per cent., but I understand that the law under which that provision was enforced has been recently repealed. The measure seemed to me a

127. To Mr. Finlayson.-I could not tell you offhand what saying would be made by using sleepers for the 3-it. 6-in. gauge. In any case the sisopers for the o-12. b-in, gauge. In any case the bridges should be made strong enough to carry a line laid on the 4-4t. 83-in, gauge, but the widening of cuttings for that gauge could be left unit it was proposed to convert from the narrow gauge. The Northern Territory line will have to be continued a very long distance outwards before it meets a broad-gauge line, but if the railway were extended from Oodnadatta northwards it might be wise to construct on a 4-ft. 81-in. gauge. Small savings could be effected by adopting the 3-ft. 6-in, gauge in the Northern Territory, but according is to be brought about rather by the method of construction—that is, by making the grades steep and the curves sharp, and by building low-level bridges. There will not be much earthwork on the country below the Katherine and Bitter Springs. The grades and curves and bridges on the line from Pine Creek to Katherine River have been designed for the adoption of the 4-ft. 81-in. gauge, and on that section a saving could have been made by providing for a line on the 3-ft. 6-in. gauge; but not much saving is to be made in that way between the Katherine River and Bitter Springs, because the country to be traversed is level. It is estimated that the excavation work will amount to only 44,000 yards. About half the cost of the line will be in rails and sleepers. For labour we are paying 14s, a day as the minimum rate. I do not think that the difference between the cost of wooden and concrete sleepers would be less relatively in the Northern Territory than in South Australia. In comparing concrete and wooden sleepers in the light of tests made on tramways it must be remembered that tramway conditions are very different

from railway conditions. Tram rails have a great lateral strength, and are made deep to maintain the roadway between the ton of the sleeper and the top of the rail. The rails used in a railway to be supported at more frequent intervals than those used in a transway, as otherwise the cost of maintenance is increased. In Queensland at one time the centres of the sleepers were 3 feet the cart, but the cost of maintenance was as great that a distance of 2 feet between the centres came to be adopted. I have no prejudice against concrete sleepers, and would be only too glid to use them if I thought that they could be used economically. But all the information I have on the subject is against them. The American opinion is against them, and I have heard that where they have been taken up. The concrete sleeper would, of course, resist the stateks of white ante, and would probably last longer in a railread where the traille was light than where the traille was light than where the trails was light.

128. To Mr. Penton.—The Committee will see the results of American experiments with concrete sleepers set out in a book outflude Schew on Sterlands, which I produce. In Queensland the number of sleepers used to the mile with a 3-tc. 6-in, gauge was 2,640; on the east-west railway I am using 2,240 aleepers to the mile, and in the Northern Territory railway there will be about 2,000 sleepers to the mile. If Mr. Hobber has estimated the saving by using wooden sleepers suitable for a 3-ft. 6-in. track at £180 a mile, the total saving on the section under consideration would be between £7,000 and £8,000. As to the route which the line follows from the Katherine to Bitter Springs, I understand the intention was to keep as near to the Barkly Tablelands as possible. If what is called the "western swing" were adopted the Roper River country would not be opened up. I have been told that Vyriddam is the port of the Victoria River district. I do not think that the Bitter Springs route was adopted simply to give access to the tim-fields at Marranhoy. So far as I know, the reports favour the Bitter Springs route was adopted simply to give access to the tim-fields at Marranhoy. So far as I know, the reports favour the Bitter Springs route was adopted simply to give access to the tim-fields at Marranhoy. So far as I know, the reports favour the Bitter Springs route was adopted simply to give access to the other states are in the office concerning what reports there are in the office concerning what reports there are in the office concerning what reports there are in the office concerning that reports there are in the office concerning

both routes. 129. To Mr. Sampson .- I agree with Mr. Francis that if there is no prespect of the 4-ft. 84-in. gauge being adopted for the next fifteen or twenty years sleepers suitable for the 3-ft. 6-in. gauge should be used, that is, supposing wooden gauge snoute occused, time as, supposing wolden-sleeport to be adopted. If steel or concrete sleep-ers were laid down, they should be made suffi-ciently long to carry the 4-ft. 8-in. gauge. I am not aware that concrete sleepers have been used in the Northern Territory railroad, but I shall ascortain, in view of what Mr. Evans has said, when and, in view of what are Lybins and said, when such sleepers were put down and what their condition is. I have not travelled through the country south of the Katharine. The line from the Katharine to Bitter Springs will pay its working expenses, and will increase traffic on the line already made. The meat works at Darwin are nearly finished, and it is expected that during the season they will treat 320 head of stock a day, which will mean a considerable cattle traffic on the line. For the five months ending 15th November last the loss on the present line was £796, and for the corresponding period of the previous year it was £2,355. Practically the line from Darwin to Pine Creek is now paying working expenses.
That is due largely to the increase in traffic caused by the conveyance of material for the extension of the line; but I expect that there will be an increase of traffic from the grazing areas which will be served. It has been estimated that the traffic earlings over the section under consideration will amount to £12,000 per annum, and the expenditure to about £11,800. I can furnish the details from which these estimates were made. What is salled the westerly swing has not been surveyed, and, to the best of my knowledge, has not been considered to any great extent.

130. To Senator Lynch .- Although the west-130. To Senator Lynch.—Although the westcity awing was recommended by a Royal Commission, I understand that the Victoria River disrict, where there is a patient of good eattle country,
has its outlet at Wyndham, and would be best
served by a railway to that bort. If the western
awing why and hope in the proper River country
would not be served. In comparing the cost of
this line with the cost of light lines made by the
Statemanth, fir instance, as that from Daliby to States—such, for instance, as that from Dalby to Boll, in Queensland, which cost £1,511 per mile, and that from Jericho to Blackall, in the same State, which cost £2,137 per mile—it must be re-membered that the first was really only a tramway. Secondhand rails were used, and the track was unballasted, the sleepers being buried in the black soil plain. On the line from Jeriche to blackall, dolb. rails were used, but most of the country is very easy. When that line was boing made, labour was receiving only 8s. a day, whereas in the Northern Territory now 14s. a day is paid. Then there is the difference in the cost of material non there is the district. The line from Charle-ville to Cunnamulla cost £1,760 a mile, but it goes through fairly lovel country. Our estimate for the section under consideration is based on the actual cost of the section under construction. It is difficult to compare the cost of one line of railway with that of another, because conditions vary so much. We used to land rails for between £6 and £7 a ton when the Charleville-Cunnamulla line was under construction, but rails at Darwin cost something like £10 a ton. My estimate of the earnings of the proposed line does not provide for a sinking fund nor for the payment of interest, neither does it allow for any writing off in respect of locomotives or rolling stock. The steel sleepers in 1889 are still quite good. Some of them had to be taken out of the salt pans near Normanton, to be taken but of the safe pairs from treatments, where the tide used to flow on to the line, but elsawhere they are unaffected by exposure. There is very little traffic on that line, and the maximum speed is not more than 20 miles an hour; but in Germany and America there are many miles of lines laid on steel sleepers. Some of the best roads in America are laid with steel sleepers. The line from Darwin to Pine Creek is carried on steel sleepers which, I am told, are still in good order, although it is about thirty years since they were laid down. We made inquiries of the Broken Hill Company whether it could manufacture steel sleepers in Newcastle, and found that it could make them quite well, but that it is booked up with rail orders. Steel sleepers are easily made. They are obtainable in several designs. There is no other place in Australia where they could be made. We imported those that we got for the first portion of the Katherine River extension from America. I would prefer steel to wood for the line under consideration could steel sleepers be got as cheaply as wooden eleepers. It is questionable whether, having regard to their long life. steel sleepers would not prove the cheaper in the seepers would not prove the eneaper in the long run. As to the powellising process, the Engineer for Existing Lines in Western Australia tells me that powellised jurnal sleepers are still the rend on the Marble Bar line, and that they look all right. I have some under observation, but they

have not been laid sufficiently long to enable me to come to a determination as to the value of the process. I have not heard of any sleepers on the east-west line being attacked by white ants.

131 To Senator Reating -I have not heard that trains cannot be run at sixty miles an hour over steel sleepers. On the contrary, I have seen numerous illustrations of high-class roads in America in which steel elcopers have been used on which trains must be run at at least that rate of which trains must be run at at least that rate of speed. When a curve is very slarn, the gauge has to be widened out, and wooden sleepers would have to be used if steel sleepers allowed no prevision to be made for such widening; but the clips are often made so that they can be varied a little to such he assessment of the steel o little, to give the necessary clearance on curves. I do not think that Mr. Evans' statement that in the Argentine steel sleepers were replaced with wooden sleopers to enable trains to be run at 60 miles an hour is correct. The steel sleepers replaced with wooden sleepers may have been de-fective in design. High speeds are run on steel sleepers. It is not likely that trains will be run at 60 miles an hour in the Northern Territory for some time to come. The cast steel that Mr. Teesdale Smith is going to produce will be of no use for the manufacture of sleepers. For the manufor the manufacture of sicopers. For the manufacture of sleopers stool plates have to be rolled and stamped out. The plant required differs entirely from a casting plant. Except in places like the salt pans, steel sleopers tast a very long time. The sleepers in the Northern Territory line may show some signs of corrosion where they have come into contact with the sea air, but elsewhere there has been no corresion at all. I have no projudice against concrete sleepers, and for years have been trying to discover one of suitable denavo been trying to discover one of suitable design. It might be possible to make such sleepes advantageously at places along a route where sand, gravel, and water were available. Concrete sleepers might prove more serviceable in the Northsteepers might prove more serviceable in the Northern Territory line, where the traffic is light, than they have proved under heavy service conditions. I think it would have been well to hay a mite of track with concrete sleepers by way of a test instead of putting down only 100 of these sleepers, as was done in Now South Wales. If we can get the rails, perhaps six months will chaps between the authorization of the pronounce extension to the authorization of the proposed extension to Bitter Springs and the laying of the sleepers, in which time a thorough inquiry could be made conwhich time a thorough inquiry could be made con-cerning the advisability of using concrete sleepers. The Department is not in any way committed to the use of wooden sleepers, though the estimate of est provides for wooden sleepers. There will be very few loops. A sum of £14,000 has been put down for station accommodation, including water supply, pumps, cattle yards, and stations. There will not be any valued platforms. will not be any raised platforms.

132. To Mr. Sampson.—Mr. Williams, the surveyor, can give you evidence regarding the other routes that have been suggested for the continuation of the line south from the Katherine.

133. To Mr. Gregory.—The traffic on the Northern Torritory line will vary considerably. There will be a cattle season, which may extend over from three to six months. It is quite possible that in parts of the year only one train a week may be run. Where there is a great deal of traffic and the road is well ballasted white ants do not cause much damage to sleepers, but where there is little traffic, and earth is banked round the sleepers the white ants often do great harm. They do more harm to sleepers in the sidines than to sleepers in the main roads. In the dry country the white ants are not likely to be bad. On the east-west

D 12

line there are very few white ants. I have seen traces of them, but not many. The country is too dry for thom.

With the consent of the Committee the following addition is made to Mr. Hesketh's evidence :---[Extract from "Preservation of Structural Timber," by Howard P. Welss.]

by Howard P. Welsz.]

As a vesult of its studies, the American Railway Engineering Association Committee concluder that no form of reinforced concrete the control of the c

#### (Taken at Melbourne.)

TUESDAY, 8111 FEBRUARY, 1916.

Present:

Mr. Rikey, Chairman;

Mr. Finlayson, Senator Keating, Mr. Sampson, Mr. Laird Smith. Senator Lynch, Senator Story, Mr. Fonton.

Theodore Ernest Day, Chief Surveyor for the Northern Territory, sworn and examined.

134 To the Chairman .- I have been Chief Surveyor in the Territory for about four years, and have been all over the section of the proposed extension, which, in my opinion, will have to be part of the main trunk line. The line need not necessarily run direct to Bitter Springs. There is some good country on the west side of the telegraph line The country has been mapped out, and I think the Commission could get a plan showing that the country right through is all good pasteral One of our surveyors travelled through with horses from Victoria River to Newcastle Waters, and by the time they got to the line they were in good condition notwithstanding that they had no more than one drink a day. The journey took about six weeks, and they picked up wonderfully. There are no permanent waters. It is good country provided there is water, which no doubt could be conserved. There are very few cattle there at present, and the trouble is that there is no water. There is a lot of beautiful sharp river sand suitable for concrete work, but I could not say as to the limestone right through. There is plenty of ironatone gravel which would make good concrete, though, perhaps, it is hardly sharp enough. If there is plenty of rock you could make all the necessary sharp stuff. Concrete would stand the white ants as well as steel. I am sure that, with the exception of cement, you could get the raw material to make the concrete sleepers. The material is handy to the trackall over the country. You could not go wrong for gravel and sand, which are the principal things, except, of course, cement. There would be engineering difficulties on the western side. Just where the western swing is shown there are a lot of rough hills, but a more direct route would

practically miss these. There are no serious diffi-culties. It would not be so difficult on the eastern side as on the western side by a long way. At the same time the western side is not a serious problem. There are no mountains in the Territory, the highest hill being only about 500 feet, They are nearly all broken ranges, and I have no doubt they could be practically avoided. Even through the ranges flats might be found. I think very little of the neighbourhood of the line as a sale of the range flats with the range flats are the range flats. white man's working country. I speak from prac-tical oxperience, and I know that the white manual labourer does not stand the climate. I took forty survey hands there about three years ago of tip-top physique, and in our first season they had all had enough. Our experience right through is that the white man cannot stand hard work in the wet season. I know that there are white men working on the railway, but the point is do they give you anything like the value in work they would in the same time in the south 1 I daresny, however, that a white man will do as much as a coloured man there, but we have to pay the white man much more, and we get a less percentage of work than in the south. White labour is very costly. As to settlement, this country is going to be occupied for a long time by the pastoralists, We have only about half-a-dozen settlers, although we have surveyed some thousands of acres for agricultural settlement. What are the setfor agricultural settlement. What are the set-tlers going to grow and live out The products could only be tropical, and they would have to compete with Java cheap Jabour, which is only five days steam from Darwin. I do not believe in agriculture at the top end of the Territory at all. I am not propared to speak as an expert in regard to mining. The gold return was £1,600,000, to say nothing of what the Chinamen have been taking out for years, and which would have been taking out for years, and which would bring the actual result up to about £2,000,000. There seemed to be no lodes, but simply little

poskets.

135. To Senotor Story.—I cannot speak of this as a geologist, but, as a "man in the street," I believe that there is a possibility of gold being discovered by deeper sinking. I have beard from niscovered by accepts similar. I have mond from recologists that they are pretty sure of this. The recologist that they are pretty sure of this. The recologist water, but that, I take it, is a matter a machinery. Once they are down at a depth of about 100 feet, they are practically flooded, and the the theoretical force of the recologist to the theoretical feet and the recologists. it is behutiful fresh water. There is some good pastoral country, as a recent survey shows, but there are he permanent waters. The stock at Victoria River get out on this country in the wet season and come back; there are then plenty of water holes. I would not say there would be less water notes. I would not say there would be less engineering difficulties in going straight through than by adopting oither swing, but there are less engineering difficulties on the cast than on the west. I would not say that the eastern awing would be easier than the middle route; they are probably about the same. I would not like to express a decided opinion without a further examination. It would be just as feasible to travel stock to the railway on the eastern route, but, of course, the fact has to be faced that on all stock routes they have be readily some a course, the fact has to be faced that on all stock routes they have to be saced that on an are seesers to have to provide water. There are seesers when there are no permanent waters and they cannot get across. We have not as yet had any sinking. There are plenty of places for dams and so forth, where the water could be conserved, and there must be quite 40 inches of rain there. There is some good holding ground, and some of the billanum could be alread out and down with conserved. bones could be cleaned out and dams put across the onds. They could conserve any amount of water for travelling stock. I have been right through from Oodnadatta to Darwin and all that the climate is good enough for white men to work at Newcastle Waters—say, between the 17th and 18th parallel. It is not, but there is no hundidity, and the nights are cool. Further south we get a hotter dry heat, and even in the Mac-donnell Ranges the nights are beautifully cool in summer. As to the kind of land for pastoral or agricultural purposes, going north from Oodna-datta, I may say first that at a place called Anacoora there is a bore, the only artesian bore in the Territory This has an output of 760,000 gallons of fresh water That is about 80 miles from Oodnadatta as the crow flies, or 4 miles inrom Ocanagata as the crow mes, or 4 miles in-side the Territory boundary. Between that and Oceanadatta is a country subject to drought, but good pastoral country with saltbush plains, mulga, and all kinds of edible bushes. As you know, this is at present all occupied. There have been very severe droughts in the last few years. From there I went to Arltunga, at the extreme eastern there I went to Aritunga, at the extreme eastern and of the Macdonnell Ranges. The country between that is sandhill country, covered with all certs of cidible bushes, with saltbush flast botween; then comes stony tableland country with good saltbush and cotton bush. When you strike the congest three are very rough time, with beautiful ranges three are very rough time, with beautiful saltbush plains between. A well is being put down 40 miles to the north by McDill Brothers, taken in conjunction with the well at Anacoora. This fact is interesting, because it shows that good water can be got in this country anywhere. They sunk the well 71 feet, and obtained enough water for 500 head of stock. All through that country there are similar localities with similar indications until you strike the ranges. These facts, in my opinion, speak well for the prospects of obtaining good water. I may mention that all this has been set forth in a report to the Department since I went there. In the Macdonnell Ranges there are plenty of permanent waterholes, and every facility for the most extensive conservaand every secure in the most of the concentration by shutting in some of the concentration by shutting in some of the concentration is a special shadown that it is splendid sheep country. They were in the pink of condition near Aritunga, although there had been practically no rain for eighteen months. It is a great point with that part of the country that a great point with that part of the country that, so long as the stock can get water the feed seems to hang on; and there is nothing in the world like saltbush mutton or boof. None of the country would be fit for agriculture except in the ranges and then only with irrigation, for the purposes of which there are possibilities of conserving plenty water tiere are possibilities of conserving plenty of water. Professor Spencer spoke very highly of the possibilities of this water conservation, and every visitor is struck with the small engineering difficulties of retaining large volumes in the gaps. The ranges extend for 400 miles will beautiful lead of the in between the contract with beautiful contracts. level flats in between where anything could be grown. At Alice Springs wonderful wheat has been grown, and water can be got anywhere there at 20 feet. Going north from the ranges for, say, 120 miles—I am speaking of the eastern side of the telegraph line—we get to the Davenport Ranges. All the country between is of second-class or thirdclass pastoral. I am not calling any of the land first class, because it is isolated, and it would not be wise to do so; but it is good land given facilities for transport and water. I would call a big lot first class if a railway ran through and the waters were proved. I may say that I am quite an en-thusiast on this district, which I thoroughly ex-amined in a visit of eight months. I saw it in a bad season, and was struck with its possibilities. I do not think there would be any deficiency of water, although we have not tried south of the

over the Macdonnell Rauges. I should say ranges, except at one place-Mount Ekinner-that the climate is good enough for white men to where in a bit of limestone country we got a supply for our own use at about 10 feet. I do not speak of north of the Davenport Ranges, because I have not been there. I have been 150 miles on the west side of the telegraph line, and I have examined the Burt Plains, which is some of the best pastoral country we have In order to tap and develop the pastoral country in the northern part of the Territory I should say that the railway ought to be run as far south as Newcastle Waters, assuming it is not possible to run it right through. If the line were extended from Oodnadatta as far as Alico Springs, you would open the best of the country at that end I know there is a considerable loss on the working of the Oodundatta line, but then, of course, Oodundatta is not in the best of the country. It always seemed to me a pity that the line should have stopped at Oodnadatta, which is really nowhere. It is stony, desert-look-ing country, but wonderfully recuperative with a good season. If the line were extended from Codmadatta to the ranges I unlesstatingly say that the present loss would decrease, if the line did not become actually payable. My reason for saying that is that the ranges are well adapted for sheep, but at the present time the wool cannot be got away. It is probably the best country in Australia for horses, and it has been proved exceptionally fine for cattle. The cattle, however, lose £5 of their value by the time they get to Oodmadata when travelling in anything like a bad season, and this, I take it, would more than cover the cost of trucking. As to running a line west of the telegraph to come up the Victor Pine all the telegraph to open up the Victoria River district, I hardly think it would be of any value, because we have to face the fact that freezing because we have to face the fact that re-works are going up at Wyndham. The commorce, I take it, of the tablelands goes to Queensland and that of south of Newcastle Waters goes to Adelaide Commercial administration is really what we have to look at, and I do not think a line there now would be of any value. The proposed through line should run either on the eastern swing or by the more direct route from Katherine -a direct line.

136. To Mr. Laird Smith .- If I were asked to submit a railway scheme for the development of the Territory I should come down the centra, because I believe that even on the western side, on the unexplored country, we should get a lot of good pastoral lands. A line coming near the centre would be a main drain for both sides. I do not think there would be much difference in the cost between the eastern and the central route. I control to casern and the control is between the western awing and the eastern swing from the centre route, but I do not think it can be more than 40 or 50 miles. I think that the present holdings along the railway are too large, and that with smaller holders there would be more produce. with similar noticers there would be more produces. There are no fences or paddocks; the cattle are allowed to roam, though, of course, they are confined to their waters. When a man takes up a bit of country he provides permanent water, and, as the cattle naturally come where it is, it acts as a fence. The practice is to let the cattle wander and remain away, the owners having the knowledge that they will come back in the dry season. The tick is bad down as far, I should say, as Tennants Creek, from that south it is not known. In the ranges there is no tick. When the railway is constructed to Bitter Springs I think the squatters will always drive their cattle to Katherine River. If the people from Roper River can get into Bitter Springs they will prefer to drive to the Katherine. North of the Katherine, however, driving is bad, especially from there to Pine Creek, and there is no doubt that the cattle sent to the freezing works in the north would have to be trucked. In the wet season the country would be too boggy, and in the dry season there is no nourishment, and the cattle would not be fit for killing. As to whether a large quantity of the rolling-stock would have to lie idle at times, or whether there would be a continuous supply of cattle, is a point on which I should not like to express an opinion. I do not think, however, that the supply of cattle would be continuous at the rail head. There would be, say, only six months in the year when cattle would be supplied at the rail head. They do not fatton all the year round. I should say there would be a supply of cattle for the freezers for six months.

cattle for the freezers for six months.

137. To Senator Lynch.—I favour either the castern swing or the middle route. On the western swing there is a large area of settlement whereas there is only a small one on the eastern swing, but I suggest the eastern because there is there good country that might be taken up. It has not been taken up by now owing to want of water, and people are just realizing the fact that there is water there. For years on the Barkly Tablelands there was no stock, and they are just now finding out that a good sub-artesian supply now finding out that a good sub-artesian supply can be got at 300 or 400 feet, I favour the eastern swing on the prospect of water on Barkly Table-lands, and the fact that the country south will minds, and the fact that the country south win eventually be taken up. The country on the western side is taken up by only two or three pastoralists. Bovril Australian Estates Company has, speaking from memory, about 12,000 square miles, and then we have Wave Hill, Gordon Downs, Willeroo, Delamere, and two or three smaller holdings on the borders of Western Australia holdings on the borders of Western Australia which really belong to Vesty Brothers. What I mean is that the whole of the land I have menmean is that the whole of the land I have mentioned, from Wave Hill inclusive, has been purchased or leazed by Vasty Brothers. Then there is Bradshaw's run which has very little cattle on it. In all this territory in the neighbourhood of the western swing the outle is Wyndham, the natural port, and they could drive the cattle of the western swing the outle drive the cattle of the western swing the outle of the western swing the wes there for most of the year, because the country is the better for driving. I favour the eastern swing because it will eventually serve a much larger area of settlement. As to the size of holdlarger area or settlement. At to the size or nota-ings which would be reasonable I should say about 500 square miles, whereas, as I have said, there is one 12,000 square miles. I have had no experience of white labour in Queensland, and I do not know of men having worked there con-tinuously in the open for a number of years. I tinuously in the open for a number of years. I can only speak from my own experience, and I know that white men do not do the same work as in the more temperate parts of the Common-wealth. I think that if the development of the top end of the Territory is to take place by means of tropical agriculture there will have to be cheap labour of some kind, white or otherwise. If we have to compete with Java, or any eastern country, we must have some kind of cheap labour. If they could find machinery to do the work well and good, but failing that we must have cheap and good, but failing that we must have chean, labour. I am speaking purely from an economic point of view. I am a lover of the idea of a white Australia, and was enthusiastic on the subject myself when I went to the Northern Territory, but my four years' experience there convinced me that, under present conditions, another view must be taken. Of course, whether in generations to come a different acclimatized race of white people spring up, is another matter. I think there would be much better hope from the

importation of some of the southern European-races. There are some Maltes there now on the railway, and they are shaping romarkably well. The Territory is in about the same latitude as Mexico, but, in the latter country, there is a mixed race. Another point is that there is trouble to get white women by 20 to the Territory; and no country can be a white man's country without white women. I think I shall be borne out by any body who has lived in the Territory when I say that white women cannot live there if they have to do their dwn housework, and that sort of thing. We hear of women who have resided there and have done well in the past, but they had their Chinese cooks and servants, which help cannot be obtained now. I tried to get a Chineso cook for my own wife, and £10 a month was the lowest wave.

to the country to which I am referring may be taken as north to which I am referring may be taken as north of the 17th parallel, or you could probably go further north and draw a line from the bottom of the Culf of Carpentaria. The climate gets better as one goes inland; the coastal country is the west. After may be fine men at Port MeArthur or at Darwin-thiers are exceptions to every rule. I are a Darwin-thiers are exceptions to every rule. I can be a discovered as a significant of the two swings I should favour the section of the two swings I should favour the tweeten of the two swings I should favour the could be got brough the middle which would be as beneficial berings, as the eastern would be as beneficial berings, as the eastern wing. Above the tablew we are going to get development on the Reper River, and so on. I have been through the proposition of the same proposition of

Victor Albert Williams, Surveyor, Commonwealth Railways, sworn and examined.

139. To the Chairman.—I have been in the Northern Territory engaged oh railway location and survey work. During the last two years I have been travelling backwards and forwards over the route of the phoposed extension making surveys. Our instructions were to proceed to Bitter Springs, where I understand, the Administrator proposed to build a township. The Government Experimental Farm is at Bitter Springs, and I understand that that is the reason this point was made for, with a view to a township in the future. We had no discretion whatever on this point, we received our instructions to survey to that place and did so. The country along the route of survey is very poor indeed, with no paternal extensive survey is very poor indeed, with no paternal estilement. There is the Government farm of which I spoke, and I understand there and three about 2,000 sheep, 50 or 60 cattle, and probably 30 or 40 horses. The railway will torminate at a point about 1; miles and the route of survey is very norman water on the route, but at King River I think that, by borning, you would strike a pormanment water on the route, but at King River I think that, by borning, you would strike a some small culverts, and so forth. It-will be resume small culverts, and so forth. It-will be resume small culverts, and so forth. It-will be resumed to the country is high enough to gravitate water. The Katherine is 350 feet above sea leval, and Bitter Frings is

just 450. As to concrete work there is a limited supply of sharp sand in the bod of the Roper crear. There are numerous ironation ridges running into the Roper, and I think there would be a fair supply of ironation gravel to be got. There would, incovere, have to be investigations as to the thickness of the seams, and as forth. I believe that you will be able to locate gravel bed for the purpose of manufacturing concrete sleepers. There are good surface indications, but we have not made tests in the way of trial shafts beyond small cuttings. The carthworks, however, are very small on this section of the line. The white ants were a great trouble to us, and I lost a number of field books. They crawled up the logs of the table and ato right through the books, and we lost a quantity of clothing, boots, and so on. In my opinion, it would be unprofitable to use any timber work on this section of the line. Steel or concrete sleepers will be necessary, unloss you can preserve or protect the wood, and I know of no way of doing that. As to mineral development there is the Sharramboy tin-field, but, so far, there are surface indications only, with very little developmental work. I understand that the battery was put up on the strength of a geological report by Dr. Jenson and others. This railway would chaapen the cost of material at survey over to Marramboy, and they have the full particulars in the Commonwealth effice.

140. To Mr. Sampson .- We have proposed no other route except the one we surveyed. From the Katherine to Newcastle Waters the country to the Katherine to Newestie Waters the country to the west is very dry—a waterless area. That is the route along the centre. I have explored the country for about 10 or 12 miles from the line, and to the westward it seems to confinue dry—poor, miserable, and country. I know nothing of the Victoria River district. I know the country on Victoria Atter district. I know the country on the westor side is very low and swampy, and sub-ject to inundations from the overflow of the Katherine; that is why we kept slightly to the east. We did not follow the telegraph line, but we were not far from it, crossing it once. There we were not lar from it, crossing it outco. Inser-is a small cattle run extending from the Kathe-rine to King River, about 25 miles, containing some 1,000 head. These could easily be trucked from the Katherine. There is no more cattle raising until we reach Bitter Springs. They come from the stations lower down the Roper—Elsie from the stations lower down the Roper-Elsie station. I was there during the mustor, and from the report there appeared to be, roughly, 4,000 head. Then, lower down the Roper-about 90 or 100 miles—there is the Hodgson Downs station, where, I understand, they muster over 7,000. They drive their cuttle up to Darwin vid the Katherine. I have not heard of them shipping them from the Roper. South of the Roper I travelled to just about Daly Waters. The country appears to improve towards the Replic Table. try appears to improve towards the Barkly Table-lands. The grass is shorter and smaller, and our lands. The grass is shorter and smaller, and our horses did better on it than on the grass further back towards the Katherine. A fair number of stock runs on the country further south. Our instructions were to take the best route from the Katherine to Bitter Springs, and to keep as direct Authorine to bitter oprings, and to keep as arrectaline as bessible, avoiding, of course, all engineering difficulties. I think an extension of the line by the mine would gather very little traffic; it would be necessary to carry the line further towards the Barkly Tablelands. I should say it would have to be extended to Anthony Lagoon, over 200 miles from Bitter Springs, before it would secure any amount of traffic. That would increase the distance. If the eastern or western

swing were to terminate at Newcastle Waters or Powell's Creek the Barkly Tablelands could be served quite well by a branch line.

141. To Mr. Finlayson .- I was in the Territory three years, and during that time was on the routes surveyed. I did the first section from Pine Creek to Katherine. I know the country between Darwin and Bitter Springs fairly well. The country between Katherine and Bitter Springs is very much better for pastoral purposes than the country from Katherine to Darwin; it improves as river for the pastors in proposes than the contry from Katherina to Darwin; it improves as you go south. The prospects of railway traffic, as well as of the development of the country, improve the further south the line is taken. As to the reasons while in impried our instructions to touch Bitter Springs, I think that the water supply was one of the chief. Bitter Springs is the lead water of the Roper, and at that point there is a good water supply. At interval along the Roper Creek, just after the wet season, there are clay-holes full of water. This is a good road followed by teamsters. You must go towards the tablelands to get traffic of any consequence. I consider that this section is a proper link in the chair connecting Darwin with either the tablelands or South Australia, and I believe the line is probably the best route for a north-nouth railway. So far as I know the country to the west of the surveyed route is not as good as that to way. So far as I know the country to the west of the surveyed route is not as good as that to the cast. It is badly watered for one thing, and the country is very poor. The battery had not started at Marranboy when I was thore. There were engineering difficulties that prevented the line being taken nearer to the tin-fields, it would be a costly line to take from Katherine by Marranboy That was not exactly the reason the line did not take in the tin-fields. At the time the aurew was authorized thap was very little line clid not take in the tin-fields. At the time the survey was authorized there was very little timown of Marrathoy, which was in its infancy. When I went from Bitter Springs, south to Daly Waters, I was engaged on a trial survey between those two places, roughly, 100 miles. That survey is still going on, and I am going back to the work very soon. There is an inquiry of some sort as to railway construction south of Bitter Springs, towards Daly Waters. We felled trees in clearing work, and found that most of them had been hollowed out by white ants, and were had been hollowed out by white ants, and were nothing but shells. The timber was practically usedess. The ants crawled up outside the legs of the table to which I have referred. They had uscless. The ants crawled up outside the logs of the table to which I have referred. They had the table to which I have referred. They had the table to which I have referred. way up through that always at night time. I have had no experience, and would not like to say what would be the life of a wooden eleoper on a railway line in that country.

142. To Senator Lynch.—I prefer the eastern swing, because I consider it will tap much better country, and that the traffic would be much greater with a better water supply. I have not been on the western side further than 10 or 12 miles off the survey line, and I do not know what that side is like from personal experience. I have, however, held conversations with land surveyers who travelled through it recently, and from them I have got the information. According to the map before mo large pasteral areas are taken up on the western swing, while on the cast there are only small exattered sattlements. The castern swing contains the better country; but on the western side I understand the pasteralists could ship their cattle from the Victoria River to Darwin and Wyndham. That is one reason I take it why land has been taken up there. I am not aware that the first section of the line from Katherine to Bitter Springs would really determine the route. We shall lose distance certainly

in getting back on the western awing, but not very much. From Bitter Springs we take a westerly swing, tapping Wileroo, and then work south. I realize that my suggestion would mean a zig-zag line, with a sharp angle at Bitter Springs, should it be decided to adopt the westerly swing and to the victoria River; but still I think it could be done if the success warranted. I have noticed not raffle whistory from Barkly Tablelands district to Darwin. White men cannot live in that country. Cartage rates are excessive. They pay 237 a ton at Daly Waters to eart flour from Pine Creek. Private enterprise cannot stand that. So far, as I know, Barkly Tablelands hold out a fair prospect as a pastoral proposition; I have not been there, but have heard reports. My evidence is that, so far as this 65 miles strip, it will not serve any settlement on the route at all; only one station—a Government station—and the Marranboy, tin-field will benish. So far as I can see the prospects of this line carrying any stock are very poor.

(Taken at Melbourne.)
FRIDAY, 1011 MARCH, 1916.

Present:

Mr. Riley, Chairman;

Senator Keating, Mr. Finlayson, Senator Lynch, Mr. Gregory, Mr. Sampson. Mr. Sampson.

David Lindsay, surveyor, sworn and examined.

143. To the Chairman.—I was a member of the Royal Commission for Northern Territory Railways and Ports which inquired into matters connected with the Northern Territory, and in that capacity I have considered the question of the construction of railways in that Territory. If know the section of the railway which it is proposed to construct between the Katherine River and Bitter Springs. I have always opposed the continuation of that line in any particular direction until an examination of the country has been made by experts. The route between the Katherine River and Bitter Springs traverses very poor country most of the way. It follows the valley of the river, and a lot of the country there is subject to inundation. I cannot understand the object of taking a railway there. I have studied this question, not merely as a member of the Commission, but for the past thirty years. I spent twelve years in the Territory, six years on the north coast. The route that I desired the Government to examine before undertaking the construction of the line to the Katherine River, would have traversed country from Pine Creek in a southerly direction, and would have crossed the Daly River, so that it would have served, not only the Roper valley, but the Victoria River country, thus making a line which would be only a few miles longer than would be the direct line, or than the line would be lift an easterly swing were adopted. We desired to visit that country as a Commission, in order to ascertain whether it would be better to adopt the westerly

plateau, upon which a railway could be built very quickly. Of course, in a land of heavy rainfall, it is necessary to keep as near to the water-shed as possible. A line with a westerly swing would probably cost more to construct; but it would get into better country sconer—into basalt country. Thus, we were afforded no opportunity of examining the country, and our recommendations were based on awarn evidence, because we were re-called before our labours were finished. The idea underlying the suggested westerly swing was to tap the great western part of the Terri-tory—the Victoria River country. This westerly swing would probably touch Willeroe, and would swing would probably touch Willeroo, and would tap the good country in the Victoria River district. I have visited the Marranboy tin-field; but there are very few tin-mining fields that would justify a deviation from a main trunk line. The westerly swing while! I have suggested would take the line much farther away from the Marranboy tin-field. I do not know what has happened to that field since I was there; but, at that, thus, thous was rething side! happened to that field since I was there; out, at that time, there was nothing visible to influence any man's judgment as to the route which a railway should follow. Even if the Government creeded a plant there to enable the rot to be tracked, my opinion in this connexion would be unaffected, because a mining first house a because a making first house a because a mining field has a life—shorter or longer, according to the value of its mines—whereas the Commonwealth value of its mines—whereas the Commonweaun wishes to construct a railway which will serve the Territory from the stand-point of permanent settlement. I favour the westerly swing of the line, because I think it would be a more paying proposition, inasmuch as it would to a more paying proposition, inasmuch as it would tap the country which carries the most cattle. Sixty or 70 miles of the route from the Victoria River to the of the route from the victoria Airest Katherine River is very poor country to travel stock over. It is true that the pastoralists travel stock over it now; but there is all the difference between travelling a few hundred head of cattle which are intended for local consumption, and travelling thousands of cattle which are intended for export.

144. To Senator Story.—Theoretically, a direct line between the two suggested swings would prove a beneath to the Victoria River country. There are two belts—the castern and western—both of which are capable of settlement and development; and if it be possible to run a line direct between the two, that would be very much better than swinging a line to either, and neglecting the other. I have no personal knowledge of the country that is included in the loop between the two swings, but I police it is a level placeau upon which a rail-way could be built very cheaply. It was practically interplored country until welve months ago. It is country with a rainfall of from 25 to 30 inches annually, and I have not seen any country with that rainfall in which water could not be obtained at a greater or less depth. A main dep8t for cattle might be found to enable cattle to travel from Bitter Springs on the east and Victoria River on the west; that would be a necessity. I do not think it is advisable to deviate from the direct line for the sake of developing a mining field, unless it is a very extensive one; and I am of opinion that the Marramboy field is not an extensive one. I would rather run a

2-ft, line from the main line to the tin-fields. I have no knowledge of the country immediately south of the Victoria River district. I do not agree with the suggestion that a spur line should be run due west from about Newcastle should be run due west from about Newcastle Waters, with a view to opening up that country. It is too far from a port for desirying purposes, and I would regard such a line, in the absence of any knowledge upon which to base a conclusion, as merely a theoretical one. If there were a large number of sheep in that country, that fact would be a justification for the construction of the line. But, until the trunk line has been built, a branch line such as that suggested is earcely worthy of consideration. I think that a railway into York McArthur is probably the most important developmental railway that it is posimportant developmental railway that it is pos-sible to construct in the Territory. That port is the natural outlet for 200,000 square miles of country, and has no other port to compete with it. It is distant, in a direct line from Port Darwin, about 650 miles. The next nearest port capable of being utilized as a place of shipment for frozen cattle is Townsville, on the cast cost of Queensland. There is no other port in the Gulf of Carpentaria which can be made fit for shipping cattle or frozen meat. The main pur-pose which will be served by a trunk line to Darwin is, that through communication will be established with the other States, and, as a result, it will be possible to conduct business more exit will be possible to conduct mismess more ex-peditionally and cheaply; and as a strategic railway it is very difficult to say whether it is more import-ant to continue the existing line south from the Katherine River, or north from Codmadats, assuming that both projects cannot be undertaken assuming that both projects cannot be undertaken simultaneously. The southern line would develop the southern half of the Territory; and, in the absence of that line, that portion of the Territory cannot be profitably occupied, although it is capable of profitable occupied. The northern portion of the Territory, even after a railway has been constructed to the Katherine, will be capable of occupation only to a limited extent. But it is absolutely necessary to have the railway at both ends, in order to obtain the full advantage of the country. In other words, both railways are vital to the development of the Territory. I certainly think that a straight line between the suggested casterly and westerly swings is preferable to either of those swings, assuming that the country is suitable, and that there are no engineering difficulties. The difference between the mileage would be very small. If we desired to serve two villages with a railway, obviously, a line that was equally distant from both would be preferable to a line running into either one of them.

146. To Senator Lynch.—When Mr. Clarke and I suggested the westerly swing, we know that there was a suitable place at Willero where eather owns a suitable place at Willero where cattle could be shipped; we were aware that powerful influence was being exerted to get the line constructed to Bitter Springs, and consequently we had to make some recommendation. That recommendation we carefully safeguarded by pointing out that we had not been afforded an opportunity to examine the country. I do not think that the building of a railway with an easterly swing would assist to develop the northern river country. But if the McArthur River line were built, that would double the best pastoral country in the Territory. There is a deep sea port available at Pellow Islands. It is a natural port. If such a line were constructed first, its cost would be saved in the less expenditure that would be involved in carrying material for the remainder of the transcontinental line. When the Pine Creek

to Katherine River railway was projected, I wanted expert examination made of the counwanted expert examination made of the celu-try, to enable us to form an opinion as to whether the line should trend in a westerly direction. There is a tot of good country on the Daly and Flora Rivers, and such a line would bring that country into the closest possible connexion with Darwin. I think that an expert examination of it is practicable within a reasonable time.

An expert could get over it at the rate of 20 miles
a day. He could travel on horseback. The tributaries of the Victoria River have their rise in the country of basaltic formation, which is coloured yellow on the map. The Territory to the east-ward of the telegraph line is sandstone and lime. Much of the country around Bitter Springs is of a auch of the country around piece springs so a poor character; and I do not know what purpose a railway there will serve, except as part of the main trunk line. Of late years, Bitter Springs has been brought into prominence by the Administrator, who, I think, has formed an absolutely erroncous idea of it. Bitter Springs has no qualifications as a main centre upon that trunk line. The western swing of the railway would suffice to develop the Victoria River downs country for many years. If a railway were constructed to Port McArthur, the produce from the Roper River country would go to that port, and the necessity for building a line to tap the Roper River country would thus be obviated. The westerly swing of the line would inflict no injury on the Barkly Tableland, because it would touch that tableland about Newcastle Waters, just as near as would the easterly swing. The Victoria River country is too far from a port of shipment to be practicable for dairying. On the Flora River, however, it would be practicable. I still adhere to the opinion which I previously expressed in favour of the westerly swing of the

146. To Mr. Sampian.—I favour the construction of a line from the McArthur River to the Barkly Tableland, to the neighbourhood of Anthony Lagoon. I have been over that particular country, and, as a matter of fact, I surveyed all the boundaries of the runs on the Barkly Tableland in 1886. If a line were constructed from the Katherine River to pick up the overland telegraph line at Powell's Creek or Newcastle telegraph line at Fowell's Crock or Newcaste Waters, it would be perfectly practicable to run a branch line out to tap the Barkly Tableland. The country that would be traversed is absolutely level. The country between Port McArthur and the Barkly Tableland is capable of great development. and that fact in itself would be a partial justifica-tion for the construction of a line of railway there. I may mention that, on the McArthur River, a very big irrigation scheme could be carried out. If the westerly swing of the main line were adopted, and the railway were continued south from Newcastle Waters towards Oodnadatta, whether it would serve any considerable portion of the Barkly Tableland would resolve itself into a question of the freights to be paid on the stock, and of Townsville competing against Darwin.
Assuming that the freights to be paid on the railway were on the Queensland basis, it would be possible to take stock from a great portion of the Barkly Tableland. The distance is not too great to enable stock to be driven, but the route passes to the westerly swing of the line which I advocate, I base my opinion chiefly on the evidence which the Commission elicited from those who were settled within the Victoria River and Willeroo country. That evidence in-dicated that the country would be developed, and

its carrying capacity trebled or quadrupled if that awing of the railway were adopted. If the ant away of the railway were adopted. It the railway followed the telegraph roate, there would not be much development in the matter of cattle raising, because the country is not capable of carrying a large number of stock. A fair amount of revenue might be obtained from that source, that I do a suppose that the term on the second of revenue might be obtained from that source, but I do not suppose that the traffic on the section of the line between litter Springs and Daly Waters would pay. At the head of the Roner River, however, there ought to be considered as a neares which, by means of drainage and irrigation, might possibly be made suitable for clear settlement. There is a strip of country on the table land to the west that looks as if it would grow wheat. There are one or two problems there which land to the west that looks as II it would grow wheat. There are one or two problems there which have not been settled, and which ought to have been. There are many million acres of loany soil, which grows grass 3 feet high, and which is as level as wheat field. That is on the route between the Katherine River and Daly Waters. the west of the works from 18 to 20 inches Under The rainfall varies from 18 to 30 inches. Under similar conditions of climate and rainfall in India, wheat is grown. Some time ago, South Australia made an experiment with Indian wheat, and it grow well. But, despite all that I have urged grow wen. But, despite at that I have urged upon the Government of the day, they have not proceeded with one experiment which would have settled this problem. It is one of the most important experiments which ought to have been undertaken in the Northern Territory. I know of no country in the world that is easier to develop by means of irrigation than are parts of the Territory. There are fine rivers there, great level plains, and, in many coses, the land 3 miles back from the river is lower than are the river banks. Thus, no great elevation of water is required. But irrigation cannot be profitably undertaken under present labour conditions. It is impossible to pay the wages that are demanded, and to compete successfully with countries which are within a stone's throw of our own continent, where agriculture is carried on by coloured labor, whose atandard of living is so much beneath ours. But the soil, climate, water, and storage capacity are there.

147. To Mr. Greyory.—The Railways and Ports Commission, of which I was a member, took evidence in Melbourne and Adelaido before it proceeded to the Territory. That evidence, however, was not sufficient in itself to justify the Commission in recommending any particular railouncessor in recommencing any particular fair-ways. The Commission spint about seven months in the Territory itself. Its members were pre-vented by the Government of the day from exam-ning the country which is capable of development under present conditions by means of railways. Six months longer were required to enable them to complete their investigations. The north and south transcontinental line is the only line which can develop the Territory. But, of course, Queensland can be developed, and a small portion of the Territory, by constructing a line into the Territory from Queensland. I am of the opinion that a railway from the Pellew Island in a south-westerly direction, would provide a more immediate return than would an extension south of 60 or 70 miles of the existing line from the Katherine River, or than would a line from Oodundatta north But it is scarcely a fair thing to pit one proposition against the others.
The three lines are absolutely necessary, because the country is so wast. It must be recollected that the Territory is 900 miles long, and that a line which would develop 400 miles of it would

not touch the other 500 miles. A line from the north would require to come as far as Alice Springs, a distance of about 300 miles. The necessity for a railway from the Macdonnell Ranges southwards lies in the fact that one has to cross a dry bolt of Australia which has a rainfall of only 5 inches, which is in South Australia. It is only in occasional years that stock can travol through that country. Even in good years, a large number cannot be travelled. Ultimately, I believe that a railway north of Ocdandatta would become a payable proposition—possibly within the next tenety years that the same time, I do not think to would prove a paying line within the next on years. That country will carry sheep, and these will pay when the country will not. I would not take any notice of sensitional returns from the Marramboy thefold, unless the crushing ran into thousands of tons. I am so extremely sceptical in regard to extensive payable tin-fields existing in Australia, that I am antiably sceptical about Marramboy. I would at the recovery the country of the country. is only in occasional years that stock can swing than with an easterly swing, in the absence of an inspection of the country. I believe that such an undertaking would secure a great deal more traffic in the immediate future. There is no settlement on the Roper River worth speak-

148. To Senator Lynch .- It might be many years before there is any settlement there.

149. To Mr. Gregory.—The Victoria River is the natural outlet for the Wave Hill district. But. so far as we can gather from evidence which has been adduced, the mouth of that river is too uncertain to enable it to be made a port. Dar-win is a better port than Wyndham, because win is a notice pore than wyndamm, occasise the latter is a place which is not if for white men to live in. It lies at the foot of a high mountain range, and is shut off from the breeze; whereas parwin stands on a level plateau, and is open to all the winds that blow. Moreover, it has a fine harbor, and is right on the sea. I am very doubtful about the possibilities of dairying in the Northern Territory. The hot season of the year is too long, and I do not think it is possible to

nako butter successfully in the wet season.

150. To Senator Lynch.—I have already said
that I favour a central routh being followed, provided that there are no engineering difficultiesand I believe that there are none. The object of the westerly swing of the transcentinental line which I have recommended, is to tap the settle-ment on the Victoria River.

(Taken by Sectional Committee at Darwin.)

SATURDAY, 15cm JULY, 1916. Present:

Senator Story, in the Chair;

Mr. Laird Smith. Mr. Sampson,

Patrick Cahill, Protector of Aborigines and Superintendent of Oenpelli Aboriginal Station, sworn and examined.

151. To Senator Story .- I have been 34 years in the Northern Territory and have ridden over nearly all of it. On one occasion I rodo from Townsville to Wave Hill; on another from Townsville to Escot, close to Burketown. Then from Normanton to Corella Downs, on the Barkly Tableland; from Townsville to Borooloola and round to Cape Don, &c. I was manager of Delamere Station for five years, and temporarily managed Corella Downs Station for fifteen months, while I was head stockman and horse-breaker for five years. In regard to the railway your Committee has under consideration, my opinion is that it should be built to follow as direct a line as possible so as to serve the country both to the west and to the east. If you swing to the west you will tap the Victoria River Downs country, you will tap the victoria liver Downs county), but not better than exists on the east, given planty of water. About Farara, on the tableland country, and from there to the head of the Roper, and from Hodgson Downs to the head of the Limmon River, is all good cattle country. There are permanent waters there, but not sufficient to run large bodies of cattle. To go to the westward in the vicinity of Willeroo you could not get along the line proposed, because of the difficult nature of the country, without great cost in cuttings. It is very swampy at times near Lake Woods, and you would require miles of bridges. After leaving the Katherine River, and before reaching the King, there is a stretch of country over which it would be far more difficult to construct a line than to the only more unicust to construct a the trant to the cost, on account of the number of small water-courses to be bridged. By keeping out further and going in a direct line to Willeroo, there are and going in a direct line to Willeron, there are no great engineering difficulties, although the country is rough. But when you leave Willeroo to approach Delamere there is a large range of freekn country—called a "jump-up" about 200 feet high, that you would have to get down. After feeving this "jump-up" country and crossing to Killarney, there is a little more broken country until you get close to Battle Greak where there. until you got deces to Battle Creek, where there is another "jump-up." I have not been beyond Killarney Station in the direction that is marked on the map, but I believe it is desert or hedgewood country between the head of the Armstrong and Lake Woods.

152. To Mr. Sampson .- I would not run a railway in a direct line from Katherine to Daly Waters as you would be missing all the present settlement, Possibly, later on, when water is available, land along that route would carry a lot of stock. I would profer to run a line direct from Katherine to Daly Waters, thence on to Newcastle Waters, rather than direct from Katherine to Renrather than direct from Katherine to Menner Springs. By going to Renner Springs you
run the lime into low, flat country hefore you
reach Authony's Lagoon. By turning off atNorth Newazite and keeping Abner Range on
the west the low-lying country at the source of the
creeks known as Mon-Mona and Bundara would
be missed. All the large creeks on the tablehald De misses. All use large creeks on the tableand running west drain into low, flat, coolabal; country, forming large tracts of awampy country, and for months in the year are uncrossable, Lake Sylvester and Lake De Burg being places where the waters from Corella and Brunette empty their Table Waste; i. 6 lbd. bu. the Nausanthe waters. Lake Woods is filled by the Newcastle Water Creek and other smaller creeks. All these Water Greek and other smaller creeks. An ineed depressions would have to be bridged for miles to depressions would have to be bridged for miles to get a line across. By turning or bearing to the south-east at the end of Abner Range, near North Rowcastle, and running direct to Eva Downs, nearly all the lake-like country could be avoided.

153. To Mr. Smith.—The good tableland country begins just north-north-east of Newcastle Waters, oggins just north-north-east of Nowcastie Waters, and runs right to Camooweal. It is good cattle and sheep country, and now they are making available good artesian water there. I have not been along the tolegraph line below Powell's Creek, but I know the whole of the country on the castern wide from Nowcastle Muters to the Concendant side from Newcastle Waters to the Queensland border in a south-easterly direction. All the tableland country is beautiful country, with

patches of what is called "desert" country, but that is the best of the land for stock purposes m the dry season. All the country known as the Barkly Tableland is the best country in the lerri-

154. To Mr. Sampson.—It is better than the Victoria River Downs, but it has not the water.

155. To Mr Smith .- If a direct route were adopted for the line, I think, as a cattle man, that the owners would certainly truck their stock rather

than drove them, excepting at eart an periods of the year, when exttle would improve while droving, 156. 10 Mr. Smith.—I am of opinion that the territory we have referred to would be used purely for producing cattle and sheep, that is, for pas-teral purposes, Later on, agriculture might de-velop if a market were available. I think a direct route would be quite practicable and free from washaways, excepting perhaps in the vicinity of the King Liver and the western branch of the Birdum or the Elsey Creek, where bridges would birdum or the Lisey Creen, where bringes would be necessary. In droving from lots of the western country it is practicable to drove to the railway line, but at times it would be necessary to go line, but at times it would be necessary to go round by the Flora River, and in that case you would not return to the Katherine, but pick up the line near Ene Creek, because the waters of the other route are too small for large bodies of cattle. As to whether it would pay the squatter to truck his earth of the them of the catherine was the superstantial to the catherine the same of the catherine was the superstantial to the state of the catherine was the superstantial to the state of the catherine was the superstantial to the state of the catherine was the superstantial to the state of the superstantial to the state of the superstantial to the state of the superstantial to the superstantial to the state of the superstantial to the sup be remembered that the farther you swing the line to the west the better it will be for the people there; but, wherever you go, bores will have to be nut down to enable the cattle to reach the railway into a different control to reach the carried into at all times. Up to August or Soptember they could probably get in, but under difficulties.

157. To if . Sunpson.—I have not been through the central country, but I believe it is good passing the central country.

the contral country, but I believe it is good pastoral country. The carrying capacity all depends upon the water available. With water sufficient for the stock, the country to the cast of the telegraph line should carry 126 cattle to the square mile. Taking it on the whole I would say that with water is should average 100 head of horned cattle to the square mile—I do not mean sheep. From Katherine to Willeroe is about 72 unlies in a direct line, but about 90 miles by miles in a direct line, but about 90 miles by the west route. If it were a question of conthe west route. If it were a question of constructing a line from Katheriu to Bitler Springs, or Katheriu to Willeron, I steadd, looking at the matter from a pasteral point of view, go to Willeron, but you are only just touching the cattle country at Willeron, and they would skill have drove from Delamere, Victoria River Downs Station, and Wave Ilill to Willeron. It depends upon the owner and the 'price of stock as owhether it would be better the no send the cattle to the railway or to Wyndham. As a general to the railway or to Wyndham. As a general rule, owners would take advantage of a railway provided the rates were not extortionate and the trucks were suitable. I do not think that a line cither to Willeroo or to Bittor Springs would pay at the present time. Willeroo, however, would pay better in the near inture, although the pay better in the near future, although the country about the head of the Roper will probably soon stock up. From a cultivation standpoint, you stop a good way short of the agricultural districts at Willeroo. When you get to Bitter Springs you get on to country which may quickly support small agriculturists—men with a few cattle, and who will grow grain of some sort. I think you would have a creater difficulty in I think you would have a greater difficulty in constructing your line to Willerso. In my opinion, the minimum area of the best land on the Barkly Tableland that a man could make a good living from, assuming the country was fenced, had ample water, and railway facilities for getting his

stock to market, would be about 25 square miles. The tableland would do well with horses, but you would get a quicker return from sheep. It is good, healthy stock country right through, but there are patches in which the minimum would have to be raised. At the present time under existing conditions, I would not attempt to start on the tableland without 300 or 400 square

158. To Senator Story .- Thore are no natural waters along the direct route; bores must be sunk. When I spoke of running to Willeroo, I was speak-When I spoke or running to whiteroo, I was speaking from a pastoral point of viow and was disregarding the possibilities of the Markanboy Tin Field: There are also big possibilities near the head of the Roper, while the country to the east and north-east of Daly Waters carries 10,000 to 12,000 cattle. Another station carries 6,000 or 7,000. All that country will carry stock, and it has big possibilities with the flats for agriculture when they can find somebody to consume their produce at a reasonable rate. The Victoria River district is carrying four or five times as much stock as the country to the east of the telegraph line, therefore a line swinging to the west would earn a bigger present revenue if they drove their stock to the railway. On the other hand, the country to the east is capable of carrying large bodies of to the case is capanio of carrying large nonce of stock, but they are not there yet. If the western awing were adopted, there would be greater engi-neering difficulties, I should say, in the vicinity of Katherine and in the vicinity of Ronner Springs, than on the eastern route, and, in my opinion, would cost half as much again as the easterly route. If the railway is intended as a trunk line, the shortest route should be followed, and adjoining districts that are worth developing tapped by branch lines. If you want the biggest revenue from cattle, carry the line towards Willeroo, but if you want a general development from other industries, follow approximately the telegraph line, If the Government were to put down a line of bores from about Battle Creek to Katherine, that stock route would serve the Victoria River district very well, and the eastern swing would be preferable from a developmental point of view. We have iron-wood in the Territory suitable for sleepers, but the cost of obtaining them would probably be too great. We have some belts of timber, but I believe it is nearly all piped by white ants. I do not think there is any possibility of getting local timber suitable for sleepers, and, even so, it would have to be treated with some arsenical preparation to make it capable of resisting white ants. If it is considered probable that concrete sleepers may be adopted, there is plenty of sand available in the Katherine River, and there are sand hills and sand ridges, but it may have to be screened. There are lots of ironstone outcrops that would provide good material for concrete also.

> (Taken by Sectional Committee at Marranboy.) MONDAY, 24TH JULY, 1916.

Present:

Senator Story, in the Chair:

Mr. Sampson, Mr. Laird Smith. William Thomas Pearce, Miner, and Manager for Walter Bell and Co., sworn and examined.

159. To Senator Story .- The Marranboy Tin Field, in my opinion, is an extensive one, and a The majority of the claims would be payable propermanent one. As far as is known, it is 8 positions if the railway came within 10 or 12

miles in length by about 2 miles wide, but I believe the same class of mineral-bearing country extends for a distance of perhaps y or lu miles and crosses the King River. In regard to the production likely to be expected from the field, I may mention that I know of one property where a shaft 8 feet by 5 feet has been sunk in the lode, and at a depth of 70 feet there are no walls in sight—ofther foot wall or hanging wall. We know by prespecting that at the bottom of the shaft the lode is at least 10 feet wide, but how much wider it is we do not know. We were going to put in levels at 70 feet, but the stone became so hard that we consider it needs machinery to break it. The stone at the bottom of the shaft at the present time carries about 8 per cent, tin. We have a No. 2 shaft, 8 feet by 6 feet, on the same property. It is down 50 feet, and we are working on the foot wall side of the lode, but we do not yet know the extent of it. There are other claims adjoining that are producing good ore for a distance of about a mile and three-quarters. I think they are on the same line of lode and should prove equally as good as the one being developed. I cannot say that the lode of which I have seen a 10 feet width extends for a mile and three-quarters -it cannot be said that it extends farther than we can see it, but it is the same lode apparently, as it runs right through the same kind of stone that we have. The centre of the field has yet to be prospected. The lode dips under the flats and comes up on to ridges again. I believe there is one claim in the centre of the field that has produced some good stone. At the north end there are several claims, but, being some distance from the battery, they do not seem to receive the same attention as those at the south end. On this field there are two parallel end. On this field there are two parattel lodes about half-a-mile apart, which are producing ore. One claim is on a lode apparently about 4 feet wide. I believe that it we can get some capital into the place things will improve considerably. There is no question of the grade of the stone, but we are handicapped by the cost of transport. The rate for carting con-centrates from Marranboy to Darwin is £20 a ton. while from Marranboy to the railway costs £12 10s, per ton. Assuming that the proposed railway came within 12 miles of Marranboy, cartage would be reduced to approximately £3 per ton. There is no question but that this field could support a fairly large population if we could get capi tal. We have several miners only too willing to bring up their wives and families, but they cannot see their way far enough ahead. If the railway came within 12 miles of Marranboy it would induce population to come here, as we would then have cheaper transport. This is a good district in which to settle, as there is some good country, on the Beswick especially, not more than three and three-quarter miles from the battery to its nearest

160. To Mr. Laird Smith .- It is good agricultural country, and would grow almost anything: English potatoes grow there at the present time.

161. To Senator Story .- The climate is excellent, and until just recently it has had the reputation of being a very healthy place. Men work here quite as well as in other places, and even the hottest part of the year produces no excessive fatigue. Rates of wages are abnormal; miners get £5 per week, but the field is rich enough to pay that rate if we get cheaper transport. At the pay that rate it we get cheaper transport. At the present time there are just a few claims that show a profit, but some others barely pay ±5 per week. The majority of the claims would be payable prothan the present drill and hammer; and for that we want capital.

163. To Mr. Laird Smith.—The sgricultural country I spoke of lies east of the battery and would be within 18 miles of the proposed railway. The railway would be the only outlet for that property. If the railway be constructed on the route proposed, it will tend to induce capital to be invested in this field; I think the field may be considered as being beyond the prospective stare, sithough there are still parts to be prospective stare, sithough there are still parts to be promay be considered as being beyond the prospecting stage, sithough there are still parts to be prospected. The lodes in my shafts are continuous; there are two lodes, running parallel to each other, and although I have not had an opinion from any. one of experience, I am inclined to believe that they come together at a lower depth. The richest stone at our 70 feet level carries about 8 per cent. tin, and our smallest percentage was obtained from a bulk crushing from the two shafts, when, from a parcel of 300 tons, we got a percentage of 4.5. I estimate we could send to the battery about 60 tons of stone per week from one property, and about 20 tons per week from the other. Calculating from what we have in sight, I should say we could reasonably expect to carry on for six months in the year. That is, we could send 80 tons of stone per week, carrying a minimum of 3 per cent. tin, for a period of six months. Under prepent conditions, with cartage at £20 per ton, our shaft, after paying all charges, showed 50 per cent. profit. It cost us £5 a foot to sink the shaft, cont. pront. 15 cost us 20 a 100 to sink the shalt, acduding explosives, and it was payable from the beginning, is still payable, and is getting wider as we go down. There is no dummying going on on this field as far as I am aware. In the event of a railway being constructed on the proposed route, a branch line to Marranboy would be costly, as it would have to cross a lot of bad country. There would get a foot or 18 inches of water—sufficient to wash away the earthworks of a light line. I think the mining is sufficiently developed, how-over, to warrant the Government taking into consideration the question of railway communication; then there is also that agricultural land I mentioned. We have had no trouble so far in getting rio from concentrates, but we may find trouble in the wet season. For four months in the year we cannot get anything, away from here, but a railway would overcome all that.

163. To Mr. Sampson,-The £20 per ton cartage to Darwin means free on board. The £12 10s. per ton is for cartage to the railway at Pine Creek. per ton is for cartage to the railway at Pine Creek. There are three members in my party, and the claims are taken up individually and comprise the "Star of the East," the "Osman," and the "Star of the Cast," the stone littly acres. I cannot tell you the quantity of stone in sight, but we value our holding at £20,000 to £30,000, basing our calculations on 4 per cent. stone. I am of opinion that the investigations we have made justify us in assuming that the field is a

164. To Mr. Laird Smith. The battery erected 108. To arr. Lura Smith.—And battery accessed has proved of great assistance in the development of the field, and in my opinion, we could not have done anything without it. It would be hard to find a better battery anywhere, and the treatment of the ore has been perfectly satisfactory.

165. To Senator Story.—In my opinion, the tin bearing atone may go down 1,000 feet, and a mine of that extent would almost keep the battery going itself. We are prepared, at any time, to guarantee to keep the battery going one shift from our own

miles, provided they worked them by other means Louis Norman Stutterd, Mining Engineer and Battery Manager, Marranboy, sworn and examined.

> 166. To Scuator Story .- I have been on the Marranboy field two years and have been over most of it. I am of opinion that the tin-bearing country comprises an area about 6 miles by 3 miles. I could not tell you the exact number of claims from which I have crushed stone, but we are on the 29th parcel now. The line of lode Mesers, Pearco and party are on is on the extreme west, and from there the lode runs for about a mile and a half of proved ore values. The value of stone sent in varies very much. Poerce and party put through two parcels, one went 16.1 and party but through two parcess, one went to:
> per cent., while the second parcel of 305 tons went
> 4.35 per cent. I should say the first parcel was
> picked out of a rich leader. I do not say two
> picked out of the lode, but it impened to be a richer lead. Some of the stone on that line of lode has gone less than 4 per cent. Dunn and Ford's went 1.64 per cent., and Sullivan's went a little over 3 per cent., perhaps 34 per cent. From the parallel line of lode farther south we have received some good values. The Buil Syndicate went, I Unint, 10 per cent, or 103 per cent, it prospectors Scharber and Richardson some stone which went about 134 per cent. There is a distance of about three-quarters of a mile between the two parallel lines of lode, but, as a mining engineer, I think they are too far apart to come together at a depth. As to how deep the lodes extend, there has not been sufficient work done to say, but the indications are good. Outside of the two lines of lode, and further to the north, there are the claims of Barton and Fischer and of Tecce and Elliot. Barton and Fisher sent in seven tons that went over 40 per cent.—that was picked stone. Then they sent in a parcel of 401 tons of second-grade ore that went about 81 per cent. They are on what we call the middle field, and I think are down about 20 feet. Teece and Elliot have a parcel of about 85 tons in now awaiting treatment. I should say, by the look of the stone, it should go about 7 or 8 per cent. As a mining engineer, I should say that if railway facilities were provided the indications are good that this were provided the indications are good that medid may develop and carry a fairly large popula-tion. Of course, the deepest shaft on the field is 70 feet, but it is good at the bottom. Further south Hutchinson's is 60 feet deep, and that went 5 per cent, for 100 tons. As to the lowest percentage that would pay under existing conditions, a lot depends on getting good men and on the cost of breaking the stone. Taking all things into consideration, I should say that 4 per cent. ore would leave a fair profit. But it all depends upon skill and method. Machine drills would have to be used, as the present hammer and drill work is too slow and costly.

167. To Mr. Laird Smith.—I have had a wide experience in Tasmania. This field is altogether different from anything I saw over there. We there have big ledes and low-grade materials, but there is nothing different about the treatment. We say that the same and different about the treatment. can get over any difficulty of any metallic iron. We have no need for pumping machinery here, We have no need for pumping machinery hero, excepting in the wet season; under ordinary conditions baling is sufficient; getting rid of water would not be costly. In regard to the receipt of sufficient material to keep the battery going I may say that we have had one stop. We ran out of stone, and had to stop for ten and a half shifts. We have very great difficulty in obtaining efficient men for the battery. At the prezent time we are more than keeping pace with reasonated in battery started, I have brought it down from 2,000 tons—the estimated quantity on the control of the control of

108. To Mr. Sampsam.—If we were working the battery three shifts we could put through about 45 to 50 ions of stone per day, and that would yield on an average 4.9 per cent, tin. The dolly out has been. 66 tons of tin running one shift. The freight to Pino Creek is £12 10s. per ton, and I believe if you take a truck you get it through from there to Darwin for 12s. 6d. per ton. Wharfage is about 10s. per ton, and covers, as far as I know, cost of leading cud unloading. I do not know what arrangement are made at Pine Creek, or whether any additional cest is incurred in putting it on the trucks. There is no difficulty in carting from the mines to the battery—we can cart at all times. I should say the shafts should be sunk to 200 feet before we could be satisfied as to the permanency of the lode. With the rail-way constructed from Pine Creek to the Katherine the teamsters would probably charge £5 to £6 a ton to eart to the latter place: that line would saye £5 to £7 at on. If the railway were brought within twelve miles of Marranhoy the ore should be run across for \$36s, or at any rate £2 a ton. To deal economically with the ore on this field it is necessary to sink main shafts, install compressors, rock drills, and winding plants. A decent compressing plant would cost about £300, but in the case of Pearce and party, for instance, that would be sufficient for their three leases, although they would be sufficient for their three leases, although they would near three would produce the content of the content of the content of the many very leavy expondature to install ap-to-

date machinery.

169. To Mr. Laird Smith.—I should require a min man of 250 tons of stone a week to warrant putting on three shifts, but if that amount were garanteed for twelve months in the year I should exclaimly recumened three shirts. To bring

the amount of stone produced. Taking the averages since the battery started, I have brought it tran lines would be better than an aerial system down from 2,000 tens—the estimated quantity on the field at the beginning—to about 500 tens now. We burn wood for the believe, for which we pay 1 dare say there have at times been rich handpicked parcels sent in to enable the mimo-owners to carry on. If a railway existed within a reasonated statence 4 per cent, tin would give a handsome profit. I know the "Oreat Boutler" in I may opinion only the main toyels and shoots would need the rails of the freight.

opinion only we man never and should be a great adtumbering.

170. To Senator Story.—It would be a great advantage to the field to have a railway; it would help in lots of ways. If there is rich pastoral country on the castern side of the telegraph line I should certainly advocate the extension of the railway in this direction. I know nothing of the pastoral country further south.

(Taken by Sectional Committee at Darwin.)

MONDAY, 7711 AUGUST, 1916.

Present:

Senator Story in the Chair; Mr. Sampson. | Mr. Laird Smith. Robert Charles Waters, Assistant Surveyor, Com-

monwealth Railways, sworn and examined.

171. To Senator Story.—I have been engaged since Soptembor last on the survey of the section of the proposed railway from Warlock Ponds to Daly Waters. I know nothing of any part of the Northern Territory excepting that along the route of the proposed line. It is 276 miles from Darwin to Warlock Ponds. For 20 miles south of Warlock Ponds. For 20 miles south of Warlock Ponds there are medium carthworks required, but from there to Birdum Creek (314 miles) they would be very light. A bridge about 360 fact long is required across the Birdum, From Birdum Crock to Daly Waters (360 miles) his practically flat country, which would require little orathworks, and presents few engineering difficulties. The country between Warlock Ponds and from Birdum Crock to Daly Waters (360 miles) his practically flat country which waters his mostly sighted country which the proposed water-washed country. Only one bridge will be required between Warlock Ponds and John Waters. From Katherine to Warlock Ponds is 76 miles by the railway route, and I have no knowledge of the Wilhero country which would be traversed by the proposed western swing. The principal harbage on the red sandy loam country is canne grass, when the great of the world be traversed by the horses and probably it is not much life if it, and what is left is very poor feed for horses and probably it is very poor feed for horses and probably it is very poor feed for horses and probably it is very poor feed for horses and probably it is very poor feed for horses and probably it is very poor feed for horses and probably it is over poor feed for horses and probably it is over poor feed for horses and probably it is over poor feed for horses and probably it is over poor feed for the recommendation of the proposed weather water, but 's gets very low it times; last year it was very low. Water required for botterine of from hores. The bore put down at No. 2 Well is reported to be ytelling 3,000 gallons a

day.

172. To Mr. Sampson.—There do not appear to be any materials suitable for concrete making on the other side of Warlock Pends—there is no sand there at all I have had no experience of concrete elegents. I think the country between Warlock Pends and Daly Waters is worthless from an agricultural port of view, as I do not know anything that would grow there. The red sandy learn might grow cereals if you could get the rain at the propertine, but between Warlock Pends and Daly

Waters the rain is not certain even in the wet season. One season they had only 3 inches, while last year I estimated they had there 40 inches. I know the lowest record at Daly Waters is about 9 inches, but I am speaking of No. 2 Well. The water obtained from the wells is good crinking water and good stock water, and the supply is said to be satisfactory, although I do not receive difficulties on the section of the route I was better to construct 60 or 70 resonance with the section of the route I should certainly say construct it to Willeware with the section of the route I will construct the section of the route I wideling which is the pick of the Territory, processing difficulties on the section of the route I wided it has water. I understand that Dr. Chew.

173. To Mr Laird Smith.—I know of no engineering difficulties on the section of the route I surveyed. There are no heavy grades or sharp curves. It is flat country and first class country through which to run a railway. There is plenty of baliast and plenty of earth for forming close to the proposed route, and the country there is not liable to inundation.

#### Nicholas Waters, Inspector of Police, Darwin, sworn and examined.

174. To Senator Story .- I have been 34 years in the Northern Territory, and have travelled a great deal over it. I have been also along the telegraph line as far as Powell's Creek. It the congraph has a far as Powell's Creek. It is very mixed country, some good, some had. I should say it is fair pastoral country, and is rather better a few miles away from the telegraph line on each side than it is on the actual route of the telegraph line. Water is not very plentiful—there are wells here and there, but I believe there has been a good deal of trouble with them, and I understand that hores are being put down now. I think bores are cheaper and more satisfactory, as sometimes the wells cave in, or the buckets get broken away, or they become contaminated. I think the line to the south should go in the most direct route and follow as far as practicable the telegraph line, if it is the intention of the Government to construct a main trunk line. In my opinion the best scheme you could have would be to first construct the main trunk line on as direct a route as possible, then make a branch line to tap the Victoria River Downs country, which at present carries two-thirds of the stock in the whole present carries two-thirds of the stock in the whole Topritory; then construct another line to go into Camooweal. I think the country between Katherine and Willeroe is slightly better than the country between Katherine and Daly Waters. From an engineering point of view I believe the country on the Bitter Springs side is more level and presents fower difficulties. I think it is an argent necessity to have a through railway, otherwise this country will never go altead in point of the property with the country will never go altead in point of wise the country will never go ahead in point of development. I think the construction of the line should be pushed on from the northern end, as there is a considerable amount of plant here, later on it should also be constructed from the south, as you would then be working in a better climate and with cheaper labour.

175. To Mr. Sampson.—I am of opinion that the Barkly Tableland country should be served from Darwin. Of course the Queensland Government would join in; they already intend I understand, to centinue their line to Camooweal. It should then lie with the people themselves whether they prefer going to Darwin or to Townsville. There appears to be a fair depth of water for any proposed harbor at the Pellew Islands, but I do not know about engineering difficulties. I think it is much more important to have a line from Powell's Creek or Newcastle Waters to Camooweal than a line to Borroloola. It would not be much use constructing a line towards Willeroo unless you continued it into the Victoria River Downs country. I prefer a direct route to the south. Botween the proposed easterly and westerly swims is a stretch of very dry country on

which stock would not do any good excepting for five or six months perhaps in the wet season, then they would have to be shifted. If I were asked to disregard a main trunk line and were asked whether it was better to construct 60 or 70 or 80 miles of railway from the Katheme, I should certainly say construct it to Willey for the tendency of the construct of the Carlon or ather than to Biter Springs or the Elsey, because the Victoria River Downs country and country of Tanami is the pile of the Territory provided it has water. I understand that Dr. Chewise the construction of the country and amongst the sand hills at shallow better found amongst the sand hills at shallow the provided the construction of the constructio

(Taken by Sectional Committee at Darwin.)
WEDNESDAY, 9th AUGUST, 1916.

Present: •

Senator Stony, in the Chair;
Mr. Sampson | Mr. Laird Smith.
John Anderson Giruth, Administrator, Northern
Territory, sworn and oxamined.

176. To Senator Story.—I am aware of the objects of the visit of the Sectional Committee to the Northern Territory, and at the request of your Committee have prepared the following state-

The linking up of the northern part of the Territory, directly or indirectly, with the great centres of population by means of a railway will prove of the utmost advantage to the Territory, and cannot be gainsaid. But that any system of railway within the Territory proper will prove a nayable undertaking in the near future is more than doubtful. I presume that it may be taken for granted that the chief reason for the construction of a railway between Derwin and the souther than the sounced with the defence of Australia and the danger especially of enemy occupation of the Darwin and Bynoe harbors—I believe the principal, if not the only effective, natural harbors for large ships on the northern litteral of Australia. At all events but for these harbors and defence generally one sees little valid argument for the northesouth Transcontinental railway in the near future. Being therefore primarily a strategic railway obviously it should connect with the most densely populated portion of Australia by the most direct route reasonably consistent with the development of the intervening country. By far the

greater portion of the population of Australia is to be found within that area which amy be bounded on the north-west by an imaginary line from Rockhampton to Adelaide, the most population centre being Sydney. It has been already agreed, however, that connexion should be made with the south-wester corner of that area. There only remains to be considered therefore the best route to subserve the economic development of the intervening country and the prosestibility of niking up, by one or more branches, with other railway systems to add to its effectiveness from a strategic stand-point. The present section of railway systems to add to its effectiveness from strategic stand-point. The present section of railway construction is appreaching Racherine, from which point it is undeded apparently what exact route shall be followed. Evidently there are under route shall be followed. Evidently there are under consideration—(1) a direct southerly route, presumbly in a belief to Oodnadatta, or at least country is portion of the total consideration—(2) a somewhat indefinite westerly swing at Williero to most the telegraph line and in the proportion of the story of the proportion of the story of the proportion of

177. To Mr. Sampson.—From Wangaella to the south in a straight line you would pass through inferior to medium pastoral country.

178. To Senator Story .- South of the 18th or 19th parallel the country generally that would be traversed would be sandy and spinifex (triodea) covered, of comparatively little pastoral value, till the Burt Plain, north of Macdonnell Ranges, s reached. The Burt Plain extends north-easterly to almost the 31st parallel in the vicinity of the Davenport Ranges, but there is no permanent water. We might obtain water from wells, but the indications we have gathered from Anthony's Well incline one to the belief that the supply would not be great. No. 2,—The Railways Com-mission plan No. 4 shows the westerly swing re-commended as proceeding direct from Katherine to Willeroe Station in a south-west direction, thence in a south-east direction to Renner Springs, themesin a south-cast direction to Rennor Springs, the distance being estimated at 320 miles as against 316 by the partially surveyed route on the cast near the tolograph line. But doubtless a curvey would raise the mileage of the Wileros swing very considerably; that is their estimated mileage owing to the broken country necessitating deviations from the straight line. South and south-west of the Katherine the country is broken and rocky, and of small pastoral value. The Kune and rocky, and of small peatoral value. The King River, one and a half to two chains wide, with high banks and many creeks, would require to be bridged. A line would therefore probably run near and almost parallel to the Katherine River till almost north of Willerco. It would seem that the time for such a route to be adopted, if at all, was prior to the extension beyond Pine Creek or oven Brock's Creek being commenced. The general trend of the direct railway to Oodnadatta or even Alice Springs would be east of south, and a sudden deviation back to westward from the Katherine crossing would require strong rozsons for its adop-tion. The W'lleroo deviation would only supply the northern extremity of the vast Victoria River district, traversing the Willeroo and part of Dela-

wost of Sturr's Plan at least, the class of country I briefly describe later. The map aboves that such a swing would not assist very greatly the southern portion of the Victoria litror country, at all ovents hardly sufficient to encourage wool-growing instead of cattle raising. From Willeros couthwards the country is poor along the route to the main stations. To avoid that had country it has secondly least placified to avoid the part of the second to the second the second that the second that the second that the second that the second the second that recently been decided to provide a new stock route. This will start from the Katherine River at a distance of from five to ten miles from the telegraph station, then run in an irregular manner until it crosses the King, then go to Wangaella; then up the Dry River until it reaches a point about due cast of Delamore; thence it will strike the heads of soveral creeks until it reaches Wave hill Station. That stock route will be provided with bores and will give a better route for cattle. No. 3-As to will give a better route for cause. No. 3—As to my reasons for "advocating construction to Mata-ranka at present time," which are requested. I think there must be some misunderstanding. I have advocated the construction of a line to Mataranka, but I have never advocated Mataranka as a terminus. I recommended it as a point to which the survey might well proceed, and even construction, pending consideration of the exact line beyond, Up to a few months ago we knew very little of the country between the proposed easterly and westerly swings. The country to the east and west was picked out not because it was any better, but because of the existence of known permanent waters. As a terminus Mataranka would be equally as futile from a profit-carning point of view as for defence for many years to come. My reasons for advocating that the line should go vid Mataranka and the Warlock Ponds near All Mataranka and the Warlock Pends near All Saints' Well are (1) Beyond Katherine Grossing, in the vicinity of Maude Creek, a considerable area of black soil country, which I have every reason to hope may be suitable for agriculture, would be served. (2) The line will be within twelve miles of Maranibo Government Battery, the centre of a very large tin field at least twenty miles in extent, which has every prospect of proving a very valuable asset to the Territory. The battery is forty miles from Katherine by the read. battery is forty miles from Katherine by the road, which is very sandy. A railway within reasonable distance will do much to stimulate development, and by reducing cost of transport will enable the lower grade lodes to be worked. (3) Although the country beyond the Maude Creek, and especially beyond the King River, is noor in quality, there is a marked alteration noticeable as Mataranka Springs are approached. From about the junction of the Beswick and Roper Creeks enward to the source of the Roper River (Mataranka) there are source of the Roper Aiver (answinning) there are considerable areas of black and rod rich looking loamy soils near the latter creek, while permanent waters are fairly numerous. At Mataranka is the source of the Roper, which begins in a series of springs whence rushes a large nover-failing and rarely varying body of beautiful looking clear water slightly above normal temperature of water in that region, very slightly alkaline but quite potable. The statements that this water is unfit for human consumpion are, to my mind, una founded. There have been no complaints from the sheep station, and my own experience is that people soon become quite accustomed to the slightly anusual taste. From the source to the junction wift the Elsey Creek, about twelve miles-beyond in a direct line, the right bank of the wards for frem about one-half to two miles towards

ı

higher and more sandy country, well grassed and with many edible shrubs. The same class of country, which is oscellent for horse-breeding, ex-tends intermittently along the Elsey Creek to the Worlock Ponds. This black will is very rich. In the wet season surface water lies in places for short periods, but it is rarely really should. I have made myself thoroughly acquainted with this country under review by visits and examinations at different periods of the year and under all conditions and an fember of coincin the country was a constraint of the contraction of the periods of the year and under all conditions and an fember of coincin the country was constraint. ditions, and am firmly of opinion it forms the most favorable site for an agricultural settlement, provided it is supplied with railway communication. Further, if any agricultural settlement here, with the proper class of settler, does not the proper class or settler, uses mu-prove successful, attempts at agriculture may then be entirely abandoned by white people in the Territory. The situation is high, it is almost as far from the coast as is poshigh, it is aimest as far from the coast as is pos-sible north of the 17th parallel; rainfall is good; water supply good, and inexhaustible. (4) Thô-railway here would also tap the Roper River Val-ley, which contains the only extent of country so far classified by the Land Board as first-class pastoral country. (5) Again, a glance at the map will show that as the courtry is developed, Darwin will become more and more unsuitable as the capital on account of its situation; a more central administration point will become necessary. This, in addition to the fact that residence in the tropics should be as far from the scaboard as possible, especially for women and children. Despite other source (Mataranka) offers the very best site available in the Territory for an inland city, because of altitude, its distance from the soa, central situa-tion, good soil, and beautiful river. Darwin is on the coast, the climate is humid, and the water supply even now insufficient at times for requireply even now insuniciona at times for require-ments; there is no supply nearor than fifteen miles, and that supply would require to be pumped. It is understood, of course, that there is no suggestion of immediate change of capital is no suggestion of immediato change of capita-site, but in considering a route for a Transcon-tinontal railway it would seem obvious that the probability of some such central city becoming a necessity in the future should be considered, es-pecially in a country badly watered by nature on the whole. Extension beyond Mataranka— between All Saint's Well, south of Mataranka, and Dale Waters feature survous of the unbetween All Saints' Well, south of Mataranka, and Daly Waters feature surveys of the unoccupied country along the tolegraph line, and on each side show it to be on the whole fair to 
medium grazing land without (excepting perhaps 
one or two very small) permanent waters. To the 
west the unoccupied land is somewhat poorer. 
Bordering the Birdum Creek there are areas of 
very rich black soil overlying limestone. The teleranh line follows the course of the Birdum Creek. very rich black soil overlying limestone. The tele-graph line follows the course of the Birdum Creek, which runs only after heavy rains. Between the Warlock Ponds (near All Saints' Well) and Daly Waters there are no permanent billabougs Travellers are supplied by Government wells. Boring for sub-artesian water is now being pro-Boring for sub-artesian water is now being presented by the Mines Department along this route. The first bore has been sunk to a dopth of 120 feet, resulting in a supply of at least 50,000 gallons per day-of good potable water. There is no reason to anticipate less favorable results further along the line. Were that route adopted, which, I believe, has been already surveyed nearly as far as Daly Waters (although no official data are apparently carallable). official data are apparently available), and runs close to the overland telegraph line, railway construction employees will thus have ample water F.16003.-E

supply by wells and bores. Another point against the central route is that if we leave the river we the central route is that if we have the river and are less likely to get artesian viator. Between Daly Waters and North Newtastle Waters (except one small billabong near Daly Weters) there are again no permanent surface weters Start's Plain, an enormous area of well-grassed untimbered greyish black soil, which is first encountered on the overland route south of the Frews Ironstone Ponds (not permanent) stretches to the westward for about eighteen to twenty miles, and northward irregu-larly to the vicinity of Milner's Well on the west side of the line. This Sturt's Plain is of much the same nature, though not quite so rich, as the plains of the Barkly Tablelands with which it is continuous. At recent them, begins in teld. continuous. At present, though portion is held on lease, it is unstocked because of the absence of surface water. There seems no reason to doubt, however, that, as elsewhere on the Barkly Tablelands, sub-artesian water will be procurable at comparatively shallow depths. North of Milner's Well, which is situated almost on the divide, the drailings of the country is towards the Roper by drainage of the Country is cowards the anoper by means of the Birdum. South of Milner's Well drainage is southwards via Newcastle Waters (permanent) to Lake Woods (not permanent). The Newcastle Waters country, including Sturt's Plain, marks the extreme western border of the great Barkly Tablelands. It rarely comes as far westward as the overland telegraph route south of South Newcastle Waters, about ten miles below the homestead, although about Renner Springs, the nomestend, atthough about stenner springs, which is a small spring, permanent buys, so to speak, of the tableland plains come again within a few miles of the line. Beyond a small plain of grey black soil with tableland characteristics, north of Banka Banka Station, this class of country is at active with the tables. country is not again met with on the telegraph line. To the west of the overland telegraph line. between approximately the 184 and 221 parallels, the country is poor and sandy, with the exception of scattered patches, although the numerous native wells indicate that water is probably pronutries wens indicate that water is probably pro-curable at shallow depth. The line traverses on the whole, till the Burt Plain, near Anthony's Well, is reached, similar country with no per-manent waters. Eastward of the telegraph line the country improves. The Davenport Ranges com-prise good pastoral country fairly well watered The tableland does not quite reach to that latitude, however, so far as our surveys indicate. Between the Davenport and Macdonnell Ranges the country is good pastoral land, devoid of per-manent waters, but with overy indication that water may be found at shallow depths by bores or even wells. It will be noted from the above that a railway following the present telegraph line between the South Newcastle Waters and the Burt Plains above the Macdonnell Ranges would at Frame above the macdonnel ranges would as meet only skirt any good, or even fair, pastoral country whatever, i.e., over a distance of about 300 miles by the route partially surveyed. I may remind you at this juncture that the railway systems of two States have at present termini within a hundred miles of the Territory borders, viz., Selwyn (Duchess Mino) in Queensland, and Oodnadatta in South Australia. Extension of the Queensland line will help to tap the richest pastoral country of the Territory—Barkly Tablelands. This extension is gradually being proceeded with, I understand. The Barkly Tableland roughly forms a rhomboid with its western nana roughly torms a mornhold with its western boundary at or near the telegraph line, between 17th and 19th parallel; its eastern boundary, so far as it lies in the Territory, being the border

between the north of latitude 18 deg. and would be no difficulty in constructing a line right 21 deg.; and the northern and southern on to the island—in fact the nutives walk across boundaries being irregular but fairly direct to the island now at low tide. Given such conboundaries being irregular but fairly direct lines between the respective northern and southern points. A priori it would seem reason-able to anticipate that any transcontinental railway would endeavour to supply and dovelop this large tract trending south-east and improving as it extends, instead of simply aftering its least valuable border and thereafter for hundreds of miles immediately serving nothing of any great practical value. For these reasons I suggest the practical value. For these reasons I suggest the railway leave the tolegraph line somewhere between Milner's Well and Newcastle Waters, at a point to be determined later, thence viz Anthony's Lagoon, Brunette and Alroy stations, or thereabouts. From Alroy Station to Camooweal is but 150 miles. The Townsville western railway is being extended, and will probably reach Camooweal or some other point on the Georgina at no west or some other point on the Georgina at no distant data. A junction between the two systems would then probably become imperative. The gap in the coastal railway system of Queensland would doubtless be filled in, even if the proposed linking up of the inland terminus were not completed, and a definite rail connexion between the populous south and the empty and dangerous north estab-lished Between the Barkly Tableland and the Macdonnell Ranges from the avidence available, there is only one length of about sixty to seventy miles of poor sandy country between the better pastoral countries through which the railway would require to cross were it again to turn south westward to meet the telegraph line about Alice Springs or Anthony's Well. The feature survey of this has not yet, however, been completed, but the maps in the Department of External Affairs, prepared by Chief Surveyor Day, show the class of country below the Davenport Ranges. It will be understood that the points mentioned above are but very approximate; the map is very empty of names, and what is thereon must be utilized. of names, and what is thereon must be utilized. Briefly, what I suggest for serious consideration, whatever northern "swing" may be decided upon, is a deviation of not more than 120 miles to the east of the telegraph line at any point. Such a deviation, it seems obvious, will possess the following advantages:—1. The Kutherine-Oodnafowing advantages:—I the Admiration-Counted data foute would not be materially lengthened, and the swing will present absolutely no engineering problems. I question if one bridge will be required. I believe the only bridge likely to be required from Katherine to Nowensle Waters is that over the King River. 2. It will miss a long stretch of poor pasteral country, which the more direct route would traverse. 3. It will help tremendously to develop our best tracts of country nearly equal in extent to half the area of the State nearly equal in extent to nair the area of the State of Victoria 4 Eventually a very chort branch will link up with the Queensland railway system. 5. The total amount of railway construction if the branch to Queensland from Alroy be included will not be greater than without the swing plus the already proposed branch to Queensland from Nawcastle Waters. In other words, supposing we were to construct a direct line and then put in a branch from Newcastle Waters to Camocweal and compare that with the line I suggest and its branch, my suggested line would be a little shorter, but I contend that even if it were a little longer, it would be justified, 6. A branch from Anthony Lagoon may in the future be made to Port McArthur, where information available in-

ditions, Port McArthur would be the natural outthe formula of the north-west of Queensland.
7. The early linking up with the Queensland system and railway connexion with the populous south will be expedited. 8. This scheme will not appreciably retard the extension of the main railway system to the Macdonnell Ranges and Ood-nadatta. U. Assuming the branch to the Gulf later on, then the natural outlet for export products from north of the Macdonnell Ranges, cast of the telegraph line may prove the northern port and not the southern, judging by the distance on the map. If so, this will again assist in peopling the north. In the foregoing I have not attempted to criticize the opinions of others. I have merely endeavoured to set before you what appeals to me as being the best route for the railway to take, bearing in mind the different factors. During the past four years I have seized every opporthe past four years I have seized every oppor-tunity of becoming personally acquainted with the Territory, and I have not confined myself to the periods of the year when travelling is most com-fortable, or when the country looks best. I have discussed the difficulties and possibilities with practically every one who has wide and long experience of the country, hence should be in a position to form a fairly just opinion. I do not propose that the swing I suggest should extend farther than about 120 miles east of the overland telegraph. It would learthen the line by wetarther than about 120 miles east of the overland tolegraph. It would lengthen the line by perhaps 160 miles, but as against that it cuts down the length of the branch to connect with Queensland. There is this further to be said that, although the distance is increased by 150 miles, the cost would not be increased proportionately, because the overland line goes through rough country which would roquire bridges, whereas going further to the east you would avoid the necessity for a single bridge.

5

179. To Mr. Sampson.—Treating the line as purely one for local development I am sausfied that a careful consideration of the stock route would lead to the abandonment of the proposed swing to Willeroo. I do not think that country is associated with a main line proposition. As regards a suggested capital at Mataranka, I would mention that most of the capitals of Europe are inland, although it is admitted they are mostly on rivers. I would add, however, that even the on rivers. I would add, however, that even the Roper could be made navigable for small boats at comparatively little expense. In the future I bolieve it would be possible to ultimately bring small boats from the mouth of the Roper, by a series of locks, to Mataranka. My support of the series of locas, to materiaria. Any support of our oxtension of the present line to Bitter Springs is absolutely associated with a further extension to tap the Barkly Tableland. Connexion with the Barkly Tableland is vital to its development, but a connexion with the Victoria River country is a connexion with the victoria aliver country is not vital to dis development, of course with the qualification that any railway communication with an area vastly improves it. I want, however, to go through the tableland so that it may be developed with sheep. I have also thought of the possibility of growing wheat in some of the sandy loam areas. I ordered some samples of sandy toam areas. I ordered some samples out Indian wheat from the Punjab, but they arrived too late for last season. I intend to get from samples next year. I have always been of the opinion that the construction of railways might Port acceptant, where mormation available in continue that the construction of railways might the whole Gulf of Carpentaria for a good harbor be made to proceed hand in hand with the settlet accommodate deep sea boats. I believe there ment of the country by insisting that the

majority of the employees should bring their wives and families with thom. I would encourage them to take up hodings so that their families could remain there while they were working on the railway, and thus form the beginning of a permanent settlement. At the present time the vast majority of the men employed are single, and even if they are saving money it is obvious the money they save is of no use to the Territory. Some men work for six or eight months or a year and then go away and take their savings with them. Last year I made inquiries amongst the men and did not find anybody who had any in-tention of settling in the Territory—that applies to people brought from overseas as well as those from the south. If a railway were connected with the south I do not think there is any possibility of settling this country with the overflow from the south, because they do not want to come so far away from their homes. Evry State is bidding against every other State to keep its own people, and in any case I do not think it is good policy to encourage the transfer of people from one part to encourage the transfer of people from one part of an empty country to another part of an empty country. I would recommend the system of en-couraging people from European countries to come here by guaranteeing them work if suitable-by paying their passages in part and making it a debt against them until they were settled in the country. I would hold out hopes that if they settled permanently the dobt might be foregone, but I would insist on either the people being married and bringing their wives and families married and bringing their wives and families with them or being closely related to those already here. I find it is not so much the attraction of his country which takes a man away, but the attraction of his friends and relations. In regard to land settlement I think there are certain areas that, with the expenditure of money could in the future be made suitable for irrigation areas, but one should be sure that those areas which can be developed without that expenditure should be devoloped first. I would apply the same condition to applicants for land, i.e., that they be married.

180. To Senator Story.—I think the proposed extension to Mataranka would materially assist in developing Marranboy. Then the question arises as to whether Marranboy should be conarises as to whother Alarranboy should be connected by a 2-ft, gauge tramway with the railway, but I would favour a rough line of the same gauge as the railway and intended solely for the conveyance of ore and goods; that would save the cost of handling. If the railway be brought within tagelye miles of Marranboy I think it would induce the introduction of capital for the development of the field. I do not think Marranboy capable of development without companies. My opinion is that to be a permanent field it will ary opinion is time to be a permanent near it will require the expenditure of a considerable amount of capital, particularly when they get down a little further. Labour-saving machinery could be used and should be used to the fullest extent. I think that even if the railway does not give complete connexion to Marranboy, the fact that it goes within twelve miles of it will tend to bring people there and add to the possibility of the railway becoming more valuable. There is every indication of Marranboy being one of the biggest tin fields in the world. There is no sign of it petering out as greater depths are reached, but of course one cannot speak definitely until the thing is proved. Even the country rock, I am told, shows traces of tin, and there is every reason to believe that other mineral fields may extend beyond the present confines of Marranboy.

#### APPENDIX.

EXTRACTS FROM REPORT BY MR. L. N. STUTTERD, MANAGER OF THE MARRANBOY BATTERY, DATED 14m JUNE, 1910, ADDRESSED TO THE DIRECTOR OF MINES.

THE MARRANBOY FIELD GENERALLY AND THE PROSPECTS OF THE CLAIMS.

The Marranboy field as at present prospected and opened up covers an approximate area of 6 miles by 3. At the end of May there were held about 32 mineral reof cloims and ten approved protected leases. The former were held to about 23 fudividuals or parties, and the latter eight.

Speaking broadly, the amount of developmental work carried out is practically nil, for only in one or two instances has any attempt been made to open up and prove the lodes in depth and values in anything ap-proaching a workmanific manner.

prove the lodes in depth and values in anything approaching a workmanille manner.

Differently situated and endowed with a more energicie and expalse class of prospector, this fold could be regarded a so-called "poor man's field," but not under conditions calling, 'he holes are hard, but values cases have been proved to continue and improve in value and size with sinking.

If the time spent scratching about the surface for the vor clustive leader, finator, co., had been spent in sinking on the fine, well-defined lodes, which are on almost all claims in evidence, Matramby vould most assuredly have half a more prosperous and brighter recent to-claying from the surface and scratch from very shallow depths stone, which, in the debtded opinion of the owner, would go anything from 20 to 60 per cent in oxide. The best epscimens would be placed interly on which would be pointed out to all comers, either out of ignorance or a desire to mislead, as a heap of stone sampled and proved to go offentimes three or four hundred per cent. Its actual precentage in tin oxide. Sampled and proved to go offentimes three or four hundred per cent. Its actual precentage in tin oxide. Sampled and proved to go offentimes three or four hundred per cent. Its actual precentage in tin oxide. Sampled and proved to go offentimes three or four hundred per cent. Its actual precentage in tin oxide. Sampled and proved to go offentimes three or four hundred per cent. Its actual precentage in tin oxide. Sampled and proved to go offentimes three or four hundred per cent. Its actual precentage in tin oxide. Sampled and proved to go offentimes three or four hundred per cent. Its actual precentage in tin oxide. Sampled and proved to go offentimes there or four hundred per cent. Its actual precentage in tin oxide. Sampled and not not successful to the control of the system of working on a number of the claims varies form 20 to

There are two or three progressive parties and individuals on the field who have turned the limited capital at their dispeas to good account. For such a proposition as Marranboy the scope of these is altogether too limited. Capital—real capital—and confidence are required to push things as they should be pushed.

push things as they should be pushed.

One party has a shaft down 75 and another 35 feet, both in well defined lode carrying good values. All though sufficient has not yet been done to finally determine the width of the lode, it ranges approximately from 7 to 14 feet. A parcel of 315 tons, home the result of sinking, &c., was treated for a yield of 13.3 tons of time strike. This together with a small picked parcel which yielded 3.3 tons of the 55%. This intances the dividend-paying proclivities of a claim or claims worked on legitimate lines.

There are an unreset is halo system a covert. There

worked on legitimate lines.

There are at present six hade systems proved. The centre system has been opened up at intervals of a few chains for all the control of the con

The lode next but one in a southerly direction has The lode next but one in a southerly direction has been opened up for about the same length, though not to fite same depth. A shaft 60 feet just off the total has been sunk, and from this and other sources there have been raised about 300 tons of stone. On the adjoining three blocks the lode has been expected as intermit, and ranges from 4 to 8 and 1 seek the limit of the same lode, and far the to wivest, the is an open out for about 80 feet, the bulk carrying very fair tin from 4 to 8 feet, the bulk carrying very fair tin

To sim up, the prospects of most of the claims are distinctly good, that is, worked in an enterprising manner on procressive lines, and, in my cpinon, this may be expected to be brought about only by the introduction of capital judiciously expended.

#### THE CLASS OF CLASS-HOLDER.

٠

The CLASS OF CLAIM-RICEDER,

During the past few week there has begun what appears to be a gradual dipheement of the underirable types of critical claim-bolder by a seamingly more able type of critical claim-bolder by a seamingly more three or the contractions. The claim of the contraction of the

The present claim and lease holders may be divided, into at least three clauses.

into at least three classes.

I First of all we have the individuals or parties who are really confident in the prospects of their holdings and the field generally, and who may be reasonably and the field generally, and who may be reasonably frust atoms raised in developing their property. This class, from time to time as finances allow, employs about irrespective of the limited number required to comply with the regulation labour conditions. The work done by most of those included under this head has been by most of those included under this head has been considered the control of th

2. Secondly there are the claim-holders with, for the most part, good holdings, but who, through lack of enterprise and often confidence, and in many cases a keen desire to sell, are merely working their claims with the idea of breaking sufficient stone to return the equivalent of good wages.

Whilst the price of tin remains high, a fair amount of stone may be expected from these; immediately the price begins to drop, however, production will for the most part cesse.

most part cease.

3. The third class of claim-holder may be altogether ignored both from a battery-supporting stand-point and a field-developing point of view. The time is not far distant when the convenient and easily obtained surface stone will easie to exist, and when the energy and time expended will not be sufficient to, produce enough to satisfy the demands of the most leminar creditor.

THE CLIMATE AND GENERAL LIVING CONDITIONS. This CLIMATE AND GENERAL LIVING CONDITIONS.

Considering the tropical situation of Marranboy the
climatic conditions may be preclaimed excellent. The
months of May, June, July, and August could be classed
as temperate, the temperature failing as low as 44
degrees during the early morping, rising gradually and
reaching the maximum shortly after noon. Of the
twolve, the months of February, March, Norember, and
December, are the most trying, the temperature ranging
to the control of the control of the control of the
two the control of the control of the control of the
two the control of the control of the control
to a middle of the control of the control
to a middle of the control of the control
to a middle of the control of the control
to a middle of the control of the control
to a middle of the control of the control
to a middle of the control of the control
to a middle of the control of the control
to a middle of the control of the control
to a middle of the control
to a middle

nor, and October are pleasant.

An occasional shower in November and early part of December heralds the approach of the "wet" season. The heavy rain, falling in frequent shower, falls during the latter part of December, January, and early "February, when the heavy showers give place to lighter ones falling occasionally, and often as late as May. The Arthur of Particular of Part registered 47 inches,

Transport facilities being inadequate, stores of all kinds were port facilities being linedequate, stores of all kinds were consistent of the fact that the constant is stated of the fact that the constant is constant in the consequent lack of vegetables, combined with the absence of fresh beef, gave rise to general ill-health This state of affairs has, to a great extent, beer conceiled, and during the last spell of we

weather locally grown vegetables, such as pumpkins, water mylons, and byans, with a more plentlini supply of fresh beef, resulted in a much improved state of general health.

#### THE CLASS OF LABOUR.

Generally appaking, me of long residence in the Territary amployed here during the construction, and subsequently performing physical labour, may be classed and incument. This may be due target to one of the construction of th

#### THE EFFICIENCY OF THE CONCENTRATING MILL,

LIB EFFICIENCY OF THE CONCENTRATION MILL.

CRUSHING operations at the battery were begun on the
2nd January of this year after a preliminary run of a
few hoper during the last day or so of December. Since
starting the mill has run one shift continuously, with
using the mill has run one shift continuously, with
whigh the property of the continuously of the
using to-bardage of ore, "That days how during the
at any, time warranted the running of more than one
shift.

The efficiency of the plant is exceedingly high as everate recoveries, which range from 90 per cent, to 90 per cent, as a streetion. The capacity has been moderate, or so that the street of the series treated and the necessity of very fine grinding. The capacity ranges from 9.7 to 20 tons per shift, according to the class of ore treated. It necessary, the capacity could be slightly increased by bringing into requisition the third grinding pan, two only being in use at present.

#### CONCLUSIONS.

CONCLUSIONS.

Based on the work done and values proved, there is every reason to believe that the Marramboy field will be permanent. I am not sware of a single instance where, in the main lode channels, the lodes or values have cut out at depth, although this may not be taken as final until the continuity of the lodes has been proved to a depth of at least two or three hundred feet; also the length of the shoots of tin has yet to be proved, for, so far, no driving has been done underground for a greater length than about of seet. To sum up, developmental education of the permanency or otherwise of the field, but the indications are very favorable.

The life of the field will depend on the economical working and handling of the lower grade ores, say, from it per cent. to 4 per cent. This means capital and efficient labour.

At present the progress of the field depends almost wholly upon class one of the claim-holders; classes two and three are not likely to produce much ore.

and three are not likely to produce much ore.

I anticipate difficulty in running one shift continuously, as I find that at the present rate of crushing and ore production the mill will catch up to the miners in about three months. During the past five months all ore raised has been treated, together with about I,100 tons of that which had accumulated prior to the commencement of the crushing operations, I estimate the ore at greats at 500 tons, this including the ore already carted and availing treatment.